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EDITORIAL.

Experiments with Padi.

In accordance with the established custom of devoting one number of the Journal annually to padi, in the present number we offer accounts of the selection and varietal trials and the manurial and cultural experiments on padi which have been carried out by the Department of Agriculture during the season 1935-36.

This season was an unfortunate one for varietal trials, as climatic conditions were far from ideal, and pests, such as stem-borers, birds and rats, caused damage which, to a great extent rendered it impossible to obtain reliable results on many of the Stations and Plots. We include, however, for purposes of record, figures for trials of various strains grown on Plots on which unsatisfactory results were obtained, but, it is emphasised that, in such cases, they do not represent the true capabilities of the given strains in these localities.

Nowhere have such new and striking results been obtained as would suggest that well established strains will be ousted by the more recent selections.

Field trial plots were laid down in the Krian District on land owned and worked by local headmen. These showed that Siam 29, a strain which, on the results of varietal trials on Departmental Test Plots, was considered to be the most suitable for the south-east portion of the District, had certain defects when planted on a large scale in this area. On the other hand, these plots confirmed the finding that Seraup Kechil 48 was fully suitable to the soft soil and deep water conditions of the north-west portion of the District and might even prove to be the best strain for the south-east area. These results show the desirability of supplementing the work on Departmental Test Plots with trials conducted by cultivators themselves before accepting any particular strain for widespread distribution.

In some parts of the country, pure strains appear to give more definite increases of yield as compared with local varieties, than in other parts, and have, in consequence, attained more popularity. In Malacca, for example, the demand for seed of the best selected strain of Siam and Nachin, which are becoming well-known locally, was considerably in excess of the supplies available on the two Government Stations, and the seed distributed amounted to well over 4,000 gantangs.

Regarding manurial trials, the most important point to which we wish to draw the attention of our readers is that, in places where phosphatic fertilizers are effective, cheap rock phosphate dust was proved as efficient as the more expensive fertilizers, and should give profitable increases of yield if it can be distributed at prices not exceeding $1.60 to $1.80 per cwt. in such districts.

Original Articles.

PADI SELECTION AND VARIETAL TRIALS 1935-1936

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Introduction.

This report, which is laid out on lines similar to those followed previously,* summarizes the results of padi varietal trials and selection work carried out by the Department of Agriculture during the 1935-36 season. As in former years, close co-operation in this work has been maintained between the Research and the Field Branches of the Department, the former being responsible for advice on the lay-out of experiments and analysis of results, and the latter for the actual carrying out of the experiments.

During the year under review, five main Experiment Stations and forty-three Test Plots were maintained, an increase of 17 Test Plots over the 1934-35 total. The new Test Plots include three in Johore, one in Perak and four in Brunei on which standard varietal trials were not laid down. New Test Plots on which varietal trials were laid down include two in Kedah, two in Perak, one in Negri Sembilan and one in Pahang. One Test Plot in Perak (Sungei Tontong, formerly in the Dindings) was abandoned owing to unsuitable conditions. The list on the next page shows the Test Plots and Stations utilized during the season under review.

Results from Experiment Stations and Test Plots in Unfederated States are included by courtesy of the Governments concerned.

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* See *Malayan Agricultural Journal,* Vol. XXIV, No. 2, February, 1936.

Note.—The gantang, which is the common local measure for padi, equals one Imperial gallon. One gantang of padi weighs approximately 5½ lbs.
One kati = 1 1/3 lbs.

Abbreviations used in the report are as follows:—

S.D.—Standard Deviation.

M.S.D.—Minimum Significant Difference between any two varietal means.

Bj.	— Bujang	R.C.	— Radin China
Ch.	— Chubai	R.C.N.	— Radin Che Nah
F.S.	— Foundation Stock	R.S.	— Radin Siak
H.	— Hybrid	Rey.	— Reyong
M.E.	— Mayang Ebus	Sm.	— Siam
M.K.	— Mayang Kuning	S.M.	— Serbok Mas
Mk.K.	— Milek Kuning	S.B.	— Seraup Besar
Mk.P.	— Milek Puteh	S.K.	— Seraup Kechil
N.	— Nachin	Ser.	— Serendah
R.	— Radin		

Distribution of Experiment Stations and Test Plots 1935-36.

State.	Name of Station or Test Plot.	Locality.	Notes.
Perlis	Seriab	Kangar	
„	Kampong Salang	„	
Kedah	Telok Chengai Experiment Station	Alor Star	
„	Langgar	Kota Star North	
„	Jitra	Kubang Pasu	
„	Sala Kanan	Kota Star South	Test Plot in new locality
„	Rantau Panjang	Kuala Muda	
„	Pulai	Baling	
„	Langkawi	Langkawi Island	New Test Plot.
Penang	Glugor	South-West District	
P. Wellesley	Bukit Merah	Central District	
Perak	Titi Serong Experiment Station	Krian	
„	Kuala Kurau	„	
„	Bagan Serai	„	
„	Briah	„	
„	Kampong Kedah	„	New Test Plot.
„	Sungei Kepar	„	„
„	Selinsing	„	
„	Bukit Gantang	Larut	
„	Lenggong	Upper Perak	
„	Bruas	Bruas	
„	Talang Experiment Station	Kuala Kangsar	
„	Sungei Manik	Lower Perak	New Test Plot.
Selangor	Panchang Bedena	Kuala Selangor	
„	Sungei Haji Durani	„ „	
„	Tanjong Karang	„ „	
„	Kuang	Ulu Selangor	
„	Kajang	Ulu Langat	
N. Sembilan	Kuala Klawang	Jelebu	
„	Ampang Tinggi	Kuala Pilah	New Test Plot.
„	Kendong	Tampin	
Malacca	Pulau Gadong Experiment Station	Central District	
Johore	Tangkak	Muar	New Test Plot.
„	Tenglu	Endau	„
„	Jementah	Segamat	„
Pahang	Kuala Lipis	Kuala Lipis	
„	Dong	Raub	
„	Temerloh	Temerloh	Abandoned at close of season.
„	Sungei Blat	Kuantan	
„	Bawang	Pekan	New Test Plot.
„	Pekan	Pekan	„
Kelantan	Central Experiment Station	Kota Bahru	
„	Pasir Puteh	Pasir Puteh	
Brunei	Kilanas	Kilanas	
„	Berakas	Berakas	New Test Plot.
„	Kuala Abang	Tutong	„
„	Lumapas	Lumapas	„
Labuan	Bukit Kallam	Bukit Kallam	„

As formerly, a standard Latin Square, arranged as shown below, was used (except where otherwise stated) and minimum significant differences between any two varieties are estimated on a basis of Fisher's 't' test for 5 per cent. points.

Standard Lay-out.

4-way Square.

A	D	B	C
D	C	A	B
C	B	D	A
B	A	C	D

5-way Square.

D	E	C	B	A
B	D	E	A	C
C	A	B	D	E
A	C	D	E	B
E	B	A	C	D

PERLIS.

The two Test Plots at Kampong Salang and Seriab were maintained under the supervision of the Principal Agricultural Officer, Kedah, and the Malay Padi Inspector, Perlis. On each Plot, randomized blocks with sub-plots of 1/45th acre were laid down. As the lay-out was unsatisfacory for statistical treatments of results, mean yields obtained from each variety are shown below, together with the number (in brackets following the varietal name) of sub-plots from which the mean was calculated.

Table I.

Seriab.			Kampong Salang.		
Variety.		Mean Yield per 1/45th acre in gantangs.	Variety.		Mean Yield per 1/45th acre in gantangs.
Sm. 29	(6)	17.4	Sm. 29	(4)	14.7
Rey. 20	(5)	10.9	Rey. 20	(4)	12.5
To 'Awang	(4)	14.8	Radin Pulau	(4)	10.7
N. 10	(5)	14.4	N. 10	(3)	14.3
Sm. 76	(6)	14.2	Sm. 76	(4)	11.9
M.E. (Local)	(4)	11.3	M.E. 88	(4)	7.7
Mean		13.8	Mean		12.0

KEDAH.

The Test Plot at Sala Kanan, abandoned the previous season owing to difficulties of water control, was re-opened on a different and more satisfactory site. In addition, a new Plot was opened at Ulu Malacca on Langkawi Island. The site of this Plot is sufficiently large to accommodate one four-way Latin Square with 1/60th acre sub-plots on the sandy soil typical of the padi areas on Langkawi.

Telok Chengai Experiment Station.

Selection.—The selection of the variety To'Seman, commenced in the season 1933-34, was continued, 49 lines being grown. These were reduced during the 1935-36 season by the discarding of 31, leaving 18 for further selection and trial.

The 5 to 5½ month varieties Nakon and Kala, locally popular as excellent eating and milling varieties, were grown in lines, 100 of the former and 50 of the latter. Forty-six lines of Nakon and seventeen of Kala were discarded as being inferior.

Selection of the Indian variety Kalyaman was not carried out as had been intended owing to poor germination of seed. Two small plots of plants were grown, however, and ears chosen for ear-to-row comparisons during the forthcoming season.

No varietal trials were held on the Station. The yields from multiplication plots are recorded in Table II, which also shows yields calculated from samples of 1/120th acre for comparison. It will be noted that Siam 29 and Radin China 4 again gave the highest yields.

Table II.

Variety.	Area (acres)	Actual Yield per acre. gantangs	Yield per acre calculated from sample plots of 1/120th acre. gantangs	Yield per acre 1934-35 season. gantangs
R.C. 4 ...	3.22	563	614	632
Sm. 29 ...	2.55	608	606	563
Rey. 20 ...	2.08	534	592	536
Sm. 76 ...	3.11	548	553	553
R.C.N. 28 ...	0.44	560	535	546
M.E. 80 ...	2.19	495	533	—
M.E. 88 ...	3.42	480	515	461
R.C. 17 ...	2.46	506	508	—
S.K. 48 ...	0.67	430	495	533
Ch. 18 ...	2.49	528	481	514
N. 10 ...	0.79	551	480	508
S.B. 15 ...	0.62	445	465	445

Note.—All manured with local guano at rate of 100 gantangs per acre one month after transplanting.

Langgar Padi Test Plot.

A four-way Latin Square was laid down on the land occupied by the five-way Square during the previous season, the varieties being the same as used in the previous four-way Square with the substitution of Reyong 20 for Radin Siak 7. Yields were lower than in the 1934-35 season, probably partly due to unfavourable weather and lodging at harvest. Table III below shows the results obtained. Yields of the four varieties are remarkably uniform and show no significant differences.

The remainder of the Test Plot was occupied by randomized blocks, replicated four times and laid down primarily for multiplication. Table IV records the mean yields, between which were no significant differences.

The whole Test Plot was manured with bat guano at the rate of 100 gantangs per acre, one month after transplanting.

Table III.

	Sm. 76	Rey. 20	Sm. 29	N. 10	Mean
Mean Yield per 1/120th acre lbs.	18.9	19.4	19.4	19.9	19.4

Table IV.

	Sm. 29	Rey. 20	Sm. 76	N. 10	Mean
Mean Yield per 1/45th acre lbs.	50.0	49.6	53.2	51.4	51.0

Jitra Padi Test Plot.

At this Test Plot, one four-way Latin Square was laid down, the remaining area being used for multiplication of varieties which were transplanted as four randomized blocks. As the land was manured the previous season, no manure was applied during the season under review. The crop suffered no loss by rats or flooding, though unfavourable weather at harvest reduced yields to some extent.

Table V shows the results of the Latin Square and of the randomized blocks.

Sala Kanan Padi Test Plot.

As this Station was opened on a new site for the 1935-36 season, some of the bunds were not properly consolidated, thus causing loss and consequent shortage of water. Rat damage also occurred and grain was lost during unfavourable weather at harvest. Nevertheless yields were not unsatisfactory. One four-way

Table V.

Latin Square.		Randomized Block	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/45th acre in lbs.
M.E. 88 ...	35.0	R.C. 4 ...	67.8
R.C. 4 ...	34.8	M.E. 88 ...	74.6
R.C. 17 ...	35.1	M.E. 80 ...	82.5
M.E. 80 ...	38.2	R.C. 17 ...	70.3
		Sm. 76 ...	78.0
Mean	35.8	Rey. 6 ...	77.0
S.D. 1.09 lbs. (2.9% of mean) M.S.D. 1.8 lbs.		Mean	75.0
		S.D. 7.35 lbs. (9.8% of mean) M.S.D. 12.7 lbs.	

Latin Square with 1/90th acre sub-plots was laid down, and the rest of the Station planted with varieties for multiplication purposes. Table VI records the results of the Latin Square experiment and mean yields of the multiplication plots.

Table VI.

Latin Square.		Multiplication Plots	
Variety.	Mean Yield per 1/90th acre in lbs.	Variety.	Mean Yield per 1/45th acre in lbs.
M.E. 88 ...	47.2	M.E. 88 ...	66.6
R.C. 17 ...	48.9	R.C. 17 ...	63.7
M.E. 80 ...	51.7	M.E. 80 ...	61.6
R.C. 4 ...	50.5	R.C. 4 ...	73.8
		Rey. 20 ...	72.4
Mean	49.6	S.K. 48 ...	65.5
S.D. 3.49 lbs. (7.0% of mean) M.S.D. 6.1 lbs.		Mean	67.2

Rantau Panjang Padi Test Plot.

The five-way Latin Square laid down at this Plot had to be modified to fit into a space with a bund in the centre. In addition to the Latin Square five replicated randomized blocks were planted for multiplication purposes. No manure was applied to the Test Plot.

Table VII shows yields recorded.

Table VII.

Latin Square		Randomized Multiplication Block	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/45th acre in lbs.
N. 10 ...	34.6	N. 10 ...	72.6
Sm. 29 ...	32.6	Sm. 29 ...	70.3
Rey. 20 ...	32.7	Rey. 20 ...	73.7
Sm. 76 ...	32.5	Sm. 76 ...	64.8
R.C. 4 ...	35.3	R.C. 4 ...	70.3
		Anak Kuching	61.9
Mean	33.5	Mean	69.1
S.D. 1.95 lbs. (5.8% of mean) M.S.D. 2.8 lbs.		S.D. 7.24 lbs. (10.4% of mean) M.S.D. 10.6 lbs.	

Pulai Padi Test Plot.

A modified five-way Latin Square and duplicated randomized blocks were laid down at this Test Plot. Planting was delayed owing to water shortage but this did not affect yields. No manures were applied.

Reyong 20, maturing earlier than other varieties, suffered severely from birds and rats. Siam 29 and Siam 76 again gave high yields.

Results are shown in Table VIII.

Langkawi Padi Test Plot.

This new Plot, opened for the first time in 1936 accommodated one four-way Latin Square, the results of which are shown in Table IX.

No manure was applied. The yields of Siam 29 and Nachin 10 compare favourably with average yields (800 to 1,100 lbs. per acre) of local varieties in Langkawi.

Table VIII.

Latin Square.		Randomized Multiplication Plots.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/45th acre in lbs.
Sm. 29 ...	42.5	Sm. 29 ...	71.6
Sm. 76 ...	39.1	Sm. 76 ...	75.0
Serendah (local)	40.2	Serendah (local)	83.0
N. 10 ...	35.2	N. 10 ...	69.5
Rey. 20 ...	28.0	Rey. 20 ...	70.1
Mean	36.6	Mean	73.8
S.D. 5.47 lbs. (14.9% of mean) M.S.D. 8.0 lbs.			

Table IX.

Variety.	Mean Yield per 1/60th acre in lbs.
R.S. 7 ...	18.9
Sm. 29 ...	25.7
N. 10 ...	25.2
Puteh Meliyau (local) ...	19.2
Mean	22.3
S.D. 1.09 lbs. (4.9% of mean) M.S.D. 1.9 lbs.	

PENANG AND PROVINCE WELLESLEY.

Glugor Padi Test Plot (Penang).

Stem-borers and rats were responsible for extensive damage to all four Latin Squares on this Test Plot. The results are thus of little value. It is reported that in Square A, Seraup Kechil 146 escaped rat damage and in Square C, Nachin 756 was more severely attacked by rats than other varieties. Flood damage, usually experienced on this Plot was not reported during the season under review.

Yields together with means are recorded in Table X.

Table X.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.K. 36 ...	6.5	Sm. 29 ...	4.0
S.K. 48 ...	8.7	R. 2 ...	3.3
Sebatil ...	9.5	R. 4 ...	6.4
S.K. 146	17.4	N. 66 ...	5.5
Mean	10.5	Mean	4.8

Square C.		Square D.	
Ser. 824 ...	9.8	Sm. 29 ...	10.5
M.E. 203 ...	6.0	R.S. 18 ...	12.4
N. 756 ...	3.2	R.S. 17 ...	10.5
M.E. 202 ...	6.9	R.S. 34 ...	7.7
Mean	6.5	Mean	10.3

Bukit Merah Padi Test Plot (Province Wellesley).

Shortly before harvest, fairly serious and general lodging occurred with consequent loss of grain. The performance of Siam 29 and Mayang Ebus 203, particularly of the latter, the two best strains of previous years, was again satisfactory.

Results are recorded in Table XI.

Table XI.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Rey. 20 ...	9.7	Sm. 29 ...	10.5
R.C. 4 ...	10.7	N. 66 ...	12.0
Rey. 6 ...	12.0	Ser. 824 ...	9.6
Rey. (local) ...	8.7	N. 756 ...	8.9
Mean	10.3	Mean	10.2
S.D. 0.82 lbs. (7.9% of mean) M.S.D. 1.4 lbs.		S.D. 0.76 lbs. (7.4% of mean) M.S.D. 1.3 lbs.	

Square C.		Square D.	
Sm. 29 ...	10.1	Sm. 29 ...	11.9
N. 66 ...	11.2	N. 66 ...	10.1
M.E. 203 ...	10.8	M.E. 80 ...	12.4
F. 63 ...	10.0	M.P. 148 ...	12.7
Mean	10.5	Mean	11.8
S.D. 0.65 lb. (6.2% of mean) M.S.D. 1.1 lbs.		S.D. 1.81 lbs. (15.4% of mean) M.S.D. 3.2 lbs.	

Table XI (*Contd.*)

Square E.	
Variety.	Mean Yield per 1/120th acre in lbs.
M.E. 203 ...	13.1
M.E. 210 ...	13.0
M.E. 88 ...	11.8
M.E. 80 ...	12.8
Mayang (local) ...	11.7
Mean	12.5
S.D. 1.06 lbs. (8.5% of mean) M.S.D. 1.5 lbs.	

PERAK.

Titi Serong Experiment Station.

Only a fair season was experienced at this Station. From late October to January there was an excess of water, and the Station could not be properly dried out at harvest. Rat damage generally was severe, but, with the exception of the Mayang Ebus Square, the Latin Squares were not badly attacked.

Pure Line Selections.—Fifteen long maturation and twelve medium maturation strains were grown during the season. Of the Seraups, Seraup Kechil 146 and 371 were again satisfactory, while Seraup Kechil 48 suffered severe rat damage. The Bujangs gave even yields but were finally discarded. Two of the old Foundation Stock lines (F.S. 42 and 48) together with Radins 4, 7, 11 and13 were satisfactory and are being maintained. The Mayang Ebus strains were disappointing and only Mayang Ebus 203 is being maintained. It is intended to introduce the Kedah selection Mayang Ebus 88 next season. Pahit, Mayang Kuning 48 and Machang 42 are being maintained.

In the ear-to-row selection now in progress, a system was introduced whereby three rows of a proved line are grown with each line under trial for comparison. This facilitated selection and will be continued.

Of the Serbok Mas lines, Serbok Mas 4 proved the best, but, as the type does not possess great potentialities, all were discarded.

Four of the eleven lines of Tongkat were discarded on the combined results of this and the previous season, leaving a balance of seven lines for further observation.

Rat damage caused difficulty in selecting the best of the ten Machang lines and only two were discarded.

Fifteen lines of Mayang Sa'Batil from Glugor did very well and are promising. Twelve lines were retained for further trial.

Thirty-three lines of Mayang Ebus from Bukit Merah Test Plot suffered severely from rat damage and from a season which apparently was unfavourable to them. Twenty-two lines are being retained and moved to Briah Test Plot, where conditions will probably be more to their liking.

Hybrids.—Making allowance for the somewhat unfavourable season, the hybrid lines (now in the fifth generation) were disappointing. Of the twenty-two lines, all were discarded except four of the hybrid Radin 2 x Seraup Kechil 36.

Varietal Trials.—The varietal trials consisted of three five-way and two four-way Latin Squares. In Square A, Seraup Kechil 146 and 371 proved the best, though not significantly better than Mayang Kuning 48. Squares C and D were used for comparison of Mayang Ebus strains. The season was reported as unfavourable to these strains and rat damage was severe. In Square E, no significant differences appeared between the Bujangs though all exceeded Seraup Kechil 48. The weak straw of the Bujangs limits their utility and in general they are better replaced by the stronger Seraup Besar 15 which they resemble. Results are shown below in Table XII.

Table XII.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.K. 48 ...	17.1	R. 1 ...	12.6
S.K. 68 ...	21.5	R. 4 ...	19.0
S.K. 146 ...	27.0	R. 7 ...	17.8
S.K. 371 ...	26.0	R. 11 ...	18.0
M.K. 48 ...	23.6	R. 13 ...	20.2
Mean	23.5	Mean	17.5
S.D. 2.84 lbs. (11.5% of mean) M.S.D. 4.1 lbs.		S.D. 2.02 lbs. (11.5% of mean) M.S.D. 2.9 lbs.	

Table XII (*Contd.*)

Square C.		Square D.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
M.E. 202 ...	16.1	M.E. 202 ...	14.0
M.E. 203 ...	14.6	M.E. 203 ...	13.5
M.E. 208 ...	14.4	M.E. 208 ...	12.9
M.E. 210 ...	14.1	M.E. 210 ...	12.9
Mean	14.6	Mean	13.3
S.D. 1.6 lbs. (7.5% of mean) M.S.D. 2.8 lbs.		S.D. 1.42 lbs. (9.3% of mean) M.S.D. 2.5 lbs.	

Squares C. & D. combined		Square D.	
M.E. 202 ...	15.1	Bj. 211 ...	21.1
M.E. 203 ...	14.1	Bj. 213 ...	21.6
M.E. 208 ...	13.6	Bj. 215 ...	21.1
M.E. 210 ...	13.5	Bj. 216 ...	21.7
Mean	14.1	S.K. 48 ...	18.0
S.D. 1.52 lbs. (10.8% of mean) M.S.D. 1.7 lbs.		Mean	20.7
		S.D. 0.91 lb. (4.4% of mean) M.S.D. 1.3 lbs.	

Kuala Kurau Padi Test Plot.

Growing conditions during the season, while not ideal, were satisfactory, and an excellent crop, equal to that of the previous season, was reaped. The yield trial consisted of a duplicated four-way Latin Square containing three Seraups and a Machang. While Seraup Kechil 146 was the best in both squares it was not significantly better than the second best variety which in one square was the unselected local Machang. In view of the superiority of Seraup Kechil 48 at this Station in the previous season, there still seems to be some doubt as to which is the best of these strains for local planting.

The results are shown in Table XIII.

Table XIII.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Square A.	Square B.	Squares A & B combined.
S.K. 48 ...	29.1	30.8 ...	29.9
S.K. 146 ...	37.3	36.7 ...	37.0
S.K. 371 ...	32.4	34.4 ...	33.4
Machang (local) ...	33.7	32.8 ...	33.3
Mean ...	33.1	33.7 ...	33.4
S.D. ...	2.5 lbs.	1.4 lbs. ...	2.1 lbs.
S.D. as percentage of mean	7.5	4.1 ...	6.3
M.S.D. ...	4.3 lbs.	2.5 lbs. ...	3.6 lbs.

Table XIV.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.K. 36 ...	15.2	R. 4 ...	18.3
S.K. 48 ...	16.5	R. 7 ...	18.7
S.K. 146 ...	16.3	R. 11 ...	18.7
S.K. 371 ...	16.4	R. 13 ...	18.5
Serendah (local)	17.2	M.E. 203 ...	13.6
Mean ...	16.3	Mean	17.6
S.D. ...	1.28 lbs.	Not analysed.	
S.D. as percentage of mean	8.0		
M.S.D. ...	1.9		

Bagan Serai Padi Test Plot.

Apart from the difficulty of reducing water level towards the end of the season, this Plot was satisfactory. Yields, however, did not fulfil the promise which is said to have been shown in their vegetative growth. Two Latin Squares were laid down and results from them are shown in Table XIV. The local unselected Serendah proved better than the Seraups, but only significantly so in the case of S.K. 36.

Briah Padi Test Plot.

The season at this Plot was satisfactory in spite of reported heavier rat damage than usual and a slight attack of *Nymphula* in the nurseries. The Kedah variety, Reyong 20, while making vigorous growth, was disappointing in yield; in Square C rats showed a preference for this variety. Mayang Ebus 88 was sufficiently satisfactory to warrant further trial.

Results of the Latin Squares are recorded in Table XV.

Table XV.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.K. 48 ...	13.6	Sm. 29 ...	19.7
S.K. 68 ...	13.4	Sm. 76 ...	19.0
S.K. 146 ...	14.2	M.E. 88 ...	16.8
S.K. 371 ...	15.1	M.E. 203 ...	16.1
		Rey. 20 ...	13.0
Mean	14.1	Mean	16.9
S.D. 0.87 lb. (6.2% of mean) M.S.D. 1.5 lbs.		S.D. 1.54 lbs. (9.1% of mean) M.S.D. 2.25 lbs.	

Table XV (*Contd.*)

Square C.		Squares B. & C. combined.
Variety.	Mean Yield per 1/120th acre in lbs.	Mean Yield per 1/120th acre in lbs.
Sm. 29 ...	17.7	18.7
Sm. 76 ...	18.3	18.6
M.E. 88 ...	15.7	16.2
M.E. 203 ...	14.5	15.3
Rey. 20 ...	14.3	13.6
Mean	16.1	Mean 16.5
S.D. 2.05 lbs. (2.7% of mean) M.S.D. 3.0 lbs.		S.D. 1.81 lbs. (10.9% of mean) M.S.D. 1.7 lbs.

Selinsing Padi Test Plot.

The crop at this Plot received a severe set back from lack of water early in the season; consequently growth was uneven. Further losses of grain were experienced through lodging which occurred some time before harvest. Pest damage was negligible. Of standard varieties all the Seraups and Mayang Ebus 88 did well. The Siams were satisfactory but Siam 29 lodged almost completely.

Table XVI.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.K. 48 ...	14.0	Sm. 29 ...	12.6
S.K. 68 ...	13.6	Sm. 76 ...	13.1
S.K. 148 ...	14.4	M.E. 88 ...	13.6
S.K. 371 ...	15.0	M.E. 203 ...	10.3
		Rey. 20 ...	12.1
Mean	14.2	Mean	12.3
S.D. 1.19 lbs. (8.4% of mean) M.S.D. 2.1 lbs.		S.D. 1.38 lbs. (11.2% of mean) M.S.D. 2.0 lbs.	

Table XVI (*Contd.*)

Square C.	
Variety.	Mean Yield per 1/120th acre in lbs.
Sm. 29 ...	14.0
Radin Kuning ...	14.8
Dok Dik ...	13.5
Radin Che Mah	12.8
Radin Puteh ...	13.5
Mean	13.7
S.D. 1.78 lbs. (12.9% of mean) M.S.D. 2.6 lbs.	

Square C was laid down to test local unselected varieties, using Siam 29 as a standard. Dok Dik appears to be of Seraup type. Radin Che Mah is a rather small-grained white Radin with many purple tips and Radin Puteh closely resembles the strains Radin 11 and 16. With the exception of Radin Che Mah, the local strains appeared to be as good as Siam 29 and superior in straw characters.

The results are shown in Table XVI.

Sungei Kepar Padi Test Plot.

This Plot was opened at the beginning of the 1935-36 season. In spite of lack of water early, and excess, together with difficulty in draining later, yields were satisfactory. The varietal trial consisted of a duplicated five-way Latin Square to test the four Seraup selections against the local unselected Seri Raja. In Square A, no significant differences appear between the strains of Seraup though all exceed Seri Raja. In Square B, varietal means are very uniform and there are obviously no significant differences.

Results are shown in Table XVII.

Table XVII.

Square A.		Square B.
Variety.	Mean Yield per 1/120th acre in lbs.	Mean Yield per 1/120th acre in lbs.
S.K. 48 ...	17.1	15.5
S.K. 68 ...	16.0	15.6
S.K. 146 ...	16.8	15.3
S.K. 371 ...	17.0	15.0
Seri Raja ...	14.5	16.0
Mean	16.2	15.5
S.D. 0.93 lb. (5.7% of mean) M.S.D. 1.3 lbs.		Not analysed.

Kampong Kedah Padi Test Plot.

Being on rather higher land than the rest of the district, preparation of the Plot was not possible before September. Although somewhat late, a satisfactory season was experienced. There appears to be little difference between the Radin strains although R. 2 and R. 4 gave significantly lower yields in Square B than the other Radins. In Square C, Reyong 20 suffered severe rat damage, and one plot was destroyed by ducks. Consequently this Square was not considered worth analysis.

Results are shown below in Table XVIII.

Table XVIII.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
R. 2 ...	18.6	R. 2 ...	18.4
R. 7 ...	17.5	R. 4 ...	18.3
R. 11 ...	18.5	R. 7 ...	20.1
R. 13 ...	19.1	R. 11 ...	20.8
		R. 13 ...	20.2
Mean	18.4	Mean	19.6
S.D. 1.86 lbs. (10.1% of mean) M.S.D. 3.2 lbs.		S.D. 1.21 lbs. (6.2% of mean) M.S.D. 1.76 lbs.	

Table XVIII (*Contd.*)

Square C.

Variety.	Mean Yield per 1/120th acre in lbs.
Sm. 29 ...	19.9
M.E. 88 ...	22.1
M.E. 203 ...	19.0
Rey. 20 (mean of 3 plots) ...	17.8
Mean	19.7
Not analysed. Damaged.	

Bukit Gantang Padi Test Plot.

Conditions during the season were again rather unsatisfactory until the new Bukit Brapit dam, erected by the Drainage and Irrigation Department, came into operation on August 13th. From then onwards a sufficient supply of water was available. Towards the end of the season, heavy rains and their continuation through January provided an excess of water. This resulted in irregular ripening and lodging of much of the crop. Consequently harvesting was rendered difficult, and was therefore more prolonged than usual.

All the strains were in the nurseries far longer than desirable as cultivation of the land was held up owing to the late commencement of the operation by surrounding cultivators.

Apart from the presence of *Nymphula* in the early stages and a small amount of rat damage, the crop escaped pests.

In respect of yields the season was very satisfactory, the average yield over the whole Plot being at the rate of 425 gantangs per acre, the highest yet recorded here. Siam 76 was used as the main crop throughout the Plot.

Results are shown in Table XIX.

Table XIX.

Square A.		Square D.		Squares A & D combined
Variety.	Mean Yield per 1/120th acre in lbs.	Mean Yield per 1/120th acre in lbs.		Mean Yield per 1/120th acre in lbs.
S.K. 146 ...	24.5	24.0 ...		24.2
S.B. 15 ...	25.9	22.1 ...		24.0
S.K. 36 ...	21.6	18.6 ...		20.1
S.K. 48 ...	24.6	19.4 ...		22.0
Mean ...	24.2	21.2		22.6
S.D.	2.02 lbs. (8.4% of mean)	1.38 lbs. (6.6% of mean)		1.73 lbs. (7.6% of mean)
M.S.D.	3.3 lbs.	2.4 lbs.		2.6 lbs.

Square B.		Square C.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Rey. 20 ...	13.2*	R. 11 ...	21.5
M.E. 210 ...	20.6	Sm. 29 ...	15.5
M.E. 203 ...	21.1	R. 13 ...	21.2
M.E. 88 ...	20.2	Sm. 76 ...	23.2
Mean	18.8	Mean	20.3
S.D. 2.65 lbs. (14.1% of mean) M.S.D. 4.6 lbs.		S.D. 2.46 lbs. (12.1% of mean) M.S.D. 4.3 lbs.	

One plot damaged by rats gave only 11 lbs. against an average of 14 lbs. for the other three plots of this variety.

Lenggong Padi Test Plot.

The effective control of water-supply at this Plot caused trouble especially during wet weather. The growth of padi was well up to standard, but serious

losses resulted from rats and other pests, and much grain was lost through extensive lodging, particularly of Seraup varieties. Consequently, statistical analysis of the four Latin Squares was not made. Yields are recorded below in Table XX.

Preliminary selections of the local varieties, Chantek Puteh and Chantek Merah were made.

Table XX.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.K. 36 ...	20.0	R. 11 ...	20.9
S.K. 48 ...	17.5 (4 plots)	R. 13 ...	21.2
S.K. 68 ...	23.0	Sm. 29 ...	18.4
S.K. 371 ...	13.6 (4 plots)	Sm. 76 ...	19.6
M.K. 48 ...	16.7 (3 plots)	Rey. 20 ...	9.5
Mean	18.2 (21 plots)	Mean	17.9

Square C.		Square D.	
M.E. 210 ...	23.0	R. 2 ...	19.6
Sm. 29 ...	16.5	R. 11 ...	18.3
M.E. 208 ...	26.5	R. 1 ...	18.5
M.E. 203 ...	23.0	R. 13 ...	20.4
M.E. 88 ...	26.4	Mean	19.2
Mean	23.1		

Bruas Padi Test Plot.

Working on levelling and stumping was completed, and preparation for planting done in June. Shortage of water delayed planting but there was a good supply of water later when the irrigation dam was completed. Growth of padi was poor throughout the Plot and heavy losses resulted from attacks of stem-borers, rats and "penyakit merah". The six Latin Squares gave no results worth statistical analysis. A record of yields is shown in Table XXI.

Table XXI.

Variety.	Mean Yield per 1/120th acre in lbs.		Variety.	Mean Yield per 1/120th acre in lbs.	
	Square A.	Square B.		Square C.	Square D.
S. K. 36 ...	15.4	8.7	R. 1 ...	9.6	7.6
S.K. 48 ...	13.9	8.8	R. 11 ...	12.2	9.2
S.K. 146 ...	15.6	12.6	R. 13 ...	11.3	11.0
S.K. 371 ...	14.8	13.0	Rey. 20 ...	6.6	7.5
Mean	14.9	10.8	Mean	9.9	8.8

Variety.	Mean Yield per 1/120th acre in lbs.	
	Square E.	Square F.
Sm. 29 ...	10.7	12.3
Sm. 76 ...	10.1	10.0
R. 11 ...	10.4	10.9
R. 13 ...	9.5	9.1
Mean	10.2	10.6

Talang Experiment Station.

Selection.—Preliminary selections were made of Radin Che Nah, a very popular padi in the Kuala Kangsar District.

Introduced Varieties.—The Hong Kong varieties A and B were again grown. They proved as disappointing as formerly and were therefore discarded.

Twelve pure strains from Coimbatore were grown. Their maturation period was short, ranging from 121 days to 158 days from seed to harvest. Several of the varieties appear more promising than is generally the case with imported strains and Co. 2, 5, 7 and 10 together with T. 670 are being retained for further trial.

Table XXII records the results obtained.

Table XXII.

Variety.	Number of Plants.	Mean Weight of Grain per Plant, gms.	Average No. of Tillers.	Maturation (seed to harvest) (days)
Co. 2 ...	296	96.5	31	158
Co. 5 ...	210	96.7	38	158
Co. 7 ...	246	85.6	33	158
Co. 10 ...	126	29.5	20	121
T. 621 ...	144	36.5	22	110
T. 670 ...	105	63.8	19	139
G. E. B. 24 ...	207	70.5	32	138
A. E. B. 178 ...	112	89.0	19	142
Rascadam ...	218	23.1	18	127
Black Puttu ...	133	29.0	16	121
Sukadas ...	213	48.2	29	139
Vankisannam ...	219	36.7	18	151

Hybrids.—The hybrids under observation included two lines of N. 10 x N. 27, seven lines of R. 2 x Sm. 29, and the fifth generation of Ser. 875 x Sm. 29. A number of lines were cut out before harvest leaving seven to be carried on. Table XXIII records data of the hybrids retained.

Table XXIII.

Hybrid No.	Number of Plants	Average Tillers	Yield per Plant gms.	Maturation Period days	
H 1/3 ...	250	18	80.5	190	R. 2 x Sm. 29
H 1/9 ...	250	18	96.2	190	
H 1/11 ...	150	17	85.2	188	
H 1/14 ...	200	18	93.8	188	
H 2a ...	1735	21	96.7	188	Ser. 875 x Sm. 29
Reciprocal (a) (N. 10 x N. 27)	28	18	56.1		
Reciprocal (b) (N. 27 x N. 10)	21	15	81.9		

Varietal Trials.—A successful season was experienced with the varietal trials, which were laid out in five four-way Latin Squares. Yields were, in general, rather better than those of the previous season and the weight to volume ratio of the grain was slightly greater. Details are shown in Table XXIV.

Table XXIV.

Variety.	Mean Yield per 1/120th acre in lbs.	
	Square A.	Square B.
S.K 48 ...	23.7	22.2
S.K. 146 ...	24.7	22.2
S.K. 371 ...	22.9	20.7
M.K. 48 ...	28.1	24.6
Mean ...	24.8	22.4
S.D.	1.61 lbs. (6.5 of mean)	4.38 lbs.
M.S.D.	2.8 lbs.	No significance.

Variety.	Square D.	Square E.	Squares D. & E. combined.
M.E. 88 ...	29.4	29.4	29.4
M.E. 202 ...	28.4	30.1	29.2
M.E. 203 ...	27.6	29.4	28.5
M.E. 210 ...	26.0	25.0	25.5
Mean ...	27.8	28.5	28.1
S.D.	1.31 lbs. (4.7% of mean)	1.87 lbs. (6.6% of mean)	1.61 lbs (5.7% of mean)
M.S.D.	2.3 lbs.	3.25 lbs.	1.8 lbs.

Table XXIV (*Contd.*)

Variety.	Square C.	
Sm. 29	26.2	
Sm. 76	24.8	S.D. 1.9 lbs. (1.9% of mean)
M.E. 203	24.1	M.S.D. 2.8 lbs.
N. 756	24.3	
R. 13	21.6	
Mean	24.2	

Sungei Manik Padi Test Plot.

This new Plot is situated in the recently opened Sungei Manik irrigated area. Twenty-four acres were planted with observation blocks of standard varieties including Seraup Kechil 36 and 48, Radins 11 and 13 and Siam 29. Lack of water resulted in the entire loss of the crop.

SELANGOR.

Panchang Bedena Padi Test Plot.

As in the 1934-35 season, this Plot gave practically no useful results. Lack of water, together with rats, stem-borers and other insect pests formed a combination of unfavourable factors which made accurate comparisons of varieties impossible. Four Latin Squares were laid down. Square D was completely destroyed by rats and borers, and Square C yielded a crop from eleven of the twenty-five subplots.

Yields and means are recorded in Table XXV.

Table XXV.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.B. 15 ...	14.9	R. 2 ...	10.1
R. 13 ...	10.7	R. 4 ...	6.3
S.K. 48 ...	10.7	R. 11 ...	5.6
S.K. 36 ...	14.3	R. 13 ...	9.9
Mean	12.6	Mean	8.0

Table XXV (*Contd.*)

Square C.			
Variety.		Mean Yield per 1/120th acre in lbs.	
Sm. 29	...	7.3	Yield obtained from 13 out of 25 plots only. 11 plots destroyed by insects and rats.
N. 66	...	8.0	
N. 756	...	5.5	
F. 824	...	2.0	
R. 13	...	2.8	

Sungei Haji Durani Padi Test Plot.

The Plot was heavily flooded soon after transplanting and many young plants were lost. This necessitated extensive supplying. Later in the season serious rat damage occurred causing uneven crop. The growth of the padi was good, but too uneven for the varietial trials to be worth analysis. Mean yields are shown below in Table XXVI.

Table XXVI.

Square A.			Square C.		
Variety.		Mean Yield per 1/120th acre in lbs.	Variety.		Mean Yield per 1/120th acre in lbs.
S.K. 36	...	9.3	F. 756	...	9.1
S.K. 146	...	12.0	F. 824	...	7.7
S.K. 48	...	11.0	N. 66	...	5.4
R. 13	...	7.5	Acheh	...	7.0
S.B. 15	...	7.7	Sm. 29	...	7.8
Mean		9.5	Mean		7.4

Square B.			Square D.		
R. 13	...	10.5	Rey. 20	...	10.7
Acheh	...	7.0	Acheh	...	8.0
R. 11	...	12.6	R. 13	...	8.4
R. 4	...	12.9	M.E. 88	...	9.7
R. 2	...	6.0	M.E. 203	...	8.4
Mean		9.8	Mean		9.0

PADI EXPERIMENT STATIONS AND TEST PLOTS. 1935-6.
O EXPERIMENT STATIONS
X TEST PLOTS
PLOTS IN BRUNEI AND LABUAN ARE NOT INCLUDED.
SIAM
LANGKAWI IS.
X LANGKAWI
PERLIS
X KAMPONG SALANG
X SERIAB
X JITRA
X LANGGAR
O TELOK CHENGAI
X SALA KANAN
X PULAI
X RANTAU PANJANG
KEDAH
PENANG
GLUGOR
PROV. WELLESLEY
X BUKIT MERAH
X LENGGONG
KELANTAN
O KOTA BAHRU
PASIR PUTEH
TRENGGANU
O TITI SERONG
KUALA KURAU
X KAMPONG KEDAH
X BRIAH
X BAGAN SERAI
X Sg. KEPAR
X SELINSING
X BUKIT GANTANG
O TALANG
PERAK
X BRUAS
X Sg. MANIK
X KUALA LIPIS
X DONG
PAHANG
X PANCHANG BEDENA
X Sg. HAJI DURANI
X TANJONG KARANG
SELANGOR
X TEMERLOH
X Sg. BLAT
X BAWANG
X PEKAN
X KUANG
X KAJANG
X KUALA KLAWANG
X AMPANG TINGGI
NEGRI SEMBILAN
X KENDONG
MALACCA
X JEMENTAH
O PULAU GADONG
X TANGKAK
X TENGLU
JOHORE
SINGAPORE
100°
101°
102°
103°
104°
6°
5°
4°
3°
2°

Tanjong Karang Padi Test Plot.

The Tanjong Karang Plot had a very much more successful season than during the previous year. A little rat damage occurred but it was not sufficiently serious to affect results appreciably. The yield of Reyong 20 in Square C is very high for the locality, averaging over 3,600 lbs. (about 650 gantangs) per acre. Square C shows an astonishingly high degree of significance, the "Z" ratio being 405.2 against 4.7 required.

Results are shown in Table XXVII.

Table XXVII.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
R. 2 ...	20.0	R. 2 ...	19.2
N. 756 ...	14.6	Sm. 29 ...	18.1
M.E. 203 ...	19.6	R.C. 12 ...	20.8
M.E. 88 ...	21.9	Rey. 20 ...	19.3
Mean	19.0	Mean	19.3
S.D. 2.17 lbs. (11.4% of mean) M.S.D. 3.8 lbs.		S.D. 3.66 lbs. No significance.	

Square C.		
Acheh ...	16.5	
R.S. 17 ...	11.8	
R.S. 34 ...	23.1	S.D. 0.8 lb. (3.9% of mean)
Rey. 20 ...	30.2	M.S.D. 1.4 lbs.
Mean	20.4	

Kuang Padi Test Plot.

Rats and insects again caused exceedingly heavy damage. Yields averaged 1 to 2 lbs. per 1/120th acre with a maximum of 3.6 lbs. per 1/120th acre (Siam 29). As this in no way represents the yielding ability of the land, figures are not recorded for the three Latin Squares which were laid down.

Kajang Padi Test Plot.

As this Plot is situated in a small isolated area of padi, results are usually poor owing to depredation by rats and birds. The season under review proved an exception, and the results of the one Latin Square laid down are shown in Table XXVIII.

Table XXVIII.

Variety.	Mean Yield per 1/120th acre in lbs.	
N. 27 ...	11.1	
Mk.P. 9 ...	13.2	S.D. 1.14 lbs. (10.5% of mean)
R.S. 34 ...	8.6	M.S.D. 1.98 lbs.
N. 756 ...	10.5	
Mean	10.9	

NEGRI SEMBILAN.

Kuala Klawang Padi Test Plot.

The site of this Plot was changed at the end of the 1934-35 season to a more favourable locality. Results of the five Latin Squares are shown in Table XXIX.

Table XXIX.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.B. 15 ...	9.1	R. 13 ...	6.0
S.K. 36 ...	7.6	R. 16 ...	6.5
M.K. 3 ...	8.7	R. 11 ...	5.6
S.K. 48 ...	7.7	R. 4 ...	4.6
Mean	8.1	Mean	5.7
S.D. 0.6 lbs. (7.4% of mean) M.S.D. 1.0 lb.		Yields low. Not analysed.	

Table XXIX (*Contd.*)

Square C.		Square D.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
M.E. 80 ...	7.9	Ser. K. ...	12.7
M.E. 209 ...	9.0	Sm. 29 ...	10.1
M.E. 203 ...	6.2	Rey. 20 ...	14.9
M.E. 202 ...	6.1	N. 66 ...	6.5
Mean	7.3	Mean	11.0

Square E.	
R. 4 ...	7.1
Mk.K. 3 ...	12.5
M.E. 203 ...	11.4
Sm. 29 ...	14.7
Mean	11.4

Ampang Tinggi Padi Test Plot.

This Plot which was utilized for the first time during the season 1935-36, suffered under the disadvantage of being situated on land which had been uncultivated for several previous seasons. Difficulty was therefore experienced in keeping weeds in check, and alterations in the positions of bunds added further trouble. Adjacent uncultivated land provided a sheltering place for rats which caused very heavy damage. Slight flooding of the Plot about a month before harvest resulted in some lodging and in uneven, delayed ripening of the crop. Consequently, the season was not particularly successful, although the yield over the whole Plot of about 300 gantangs (1,600 to 1,700 lbs.) per acre may be considered fairly good for the locality.

From observations made during the growing period, it appears that certain varieties are especially favoured by rats. Among such are all the strains of Radin Siak, and, to a considerable extent, Siam 29.

Results of the four Latin Squares are shown in Table XXX. Squares A, B and C were not considered worth analysis.

Table XXX.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
R. 2 ...	7.7	Sm. 29 ...	5.9
R. 11 ...	16.5	N. 11 ...	9.2
R. 13 ...	10.5	Mk. K. 3 ...	13.0
Ser. K. ...	16.1	Raja Bersanding	18.2
Mean	12.7	Mean	11.6

Square C.		Square D.	
R.S. 7 ...	10.2	M.E. 203 ...	22.2
R.S. 17 ...	6.9	Ser. 875 ...	10.9
R.S. 18 ...	8.6	Mk.P. 9 ...	15.4
R.S. 34 ...	9.4	Rey. 20 ...	24.9
Mean	8.6	Mean	18.4
		S.D. 1.48 lbs. (8% of mean) M.S.D. 2.6 lbs.	

Kendong Padi Test Plot.

In spite of little damage from pests, yields from this Plot were disappointing, none exceeding about 1,400 lbs. (250 gantangs) per acre. Milek Kuning 3, the highest yields, barely touches this figure. Serendah 875, planted rather too early, lost grain through attacks of birds. Results are recorded in Table XXXI.

Table XXXI.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.K. 48 ...	8.6	N. 66 ...	8.5
R. 13 ...	8.1	Sm. 29 ...	9.2
S.K. 36 ...	8.0	Ser. K. ...	7.2
S.B. 15 ...	9.4	R. 2 ...	7.6
Mean	8.5	Mean	8.2
Not analysed.		S.D. 1.09 lbs. (13.2% of mean) M.S.D. 1.9 lbs.	

Square C.		Square D.	
Ser. K. ...	9.8	R.S. 34 ...	10.2
Mk.K. 3 ...	12.4	R.S. 18 ...	7.8
N. 11 ...	7.4	R.S. 17 ...	9.9
Ser. 875 ...	4.5	R.S. 7 ...	10.1
F. 28 ...	7.8	R.S. 24 ...	7.1
Mean	8.4	Mean	9.0
S.D. 0.76 lb. (9% of mean) M.S.D. 1.1 lbs.		S.D. 1.61 lbs. (17.8% of mean) M.S.D. 2.3 lbs.	

MALACCA.

Pulau Gadong Experiment Station.

In general, a satisfactory season was experienced at this Station. A little damage from rats and insects occurred, but on the whole the Station remained fairly free from pests. Apart from flooding in August, weather conditions were good, especially at harvest when dry hot weather prevailed. Yields from this Station as a whole showed an increase of some fifty piculs over those of the previous season, and the quality of the grain was good.

The programme included selection, maintenance of pure lines of former selections, and varietal trials, summarized below:—

Selection.—Initial selection was done on two varieties from Pahang and on five from Negri Sembilan.

Seri Menjadi from Pahang, a tall 7-month variety has good straw, and a rather long white grain, bold in type. It has a strong tendency to produce awns. Yields are only moderate, the best line averaging 66 grams per plant. Several mixed lines were discarded.

Gandar, another tall 7-month variety from Pahang has a good straw, and large, bold, reddish grain, red tipped. It appears somewhat indifferent, the highest-yielding line averaging 50 grams per plant. The majority of lines were mixed.

Serendah Kuning, a dwarf variety from Negri Sembilan maturing in 7 months, has a round reddish-brown grain. The lines were uniform but the heaviest yielder averaged only 62 grams per plant.

Serendah Puteh, also from Negri Sembilan, is similar to Serendah Kuning except that the grain is white. The best line yielded an average of 59 grams per plant.

Serendah Salleh is an indifferent and mixed variety, the best line of which averaged 50 grams per plant.

Radin Guntor appears to be very poor. It is much inferior to the present Radin selections, and has a distorted panicle. It is being discarded.

Antar Bras, a tall variety, is later in maturation than the other varieties from Negri Sembilan. It appears to have a very poor yield, the best lines averaging only 41 grams per plant.

Serendah, a local variety, reached the second season of selection. The promise shown by the variety during the previous season was not fulfilled, and yields were distinctly indifferent. The average yield from 23 lines was 51 grams per plant, the best line giving only 68 grams per plant.

Field selection was done in the Central District of Malacca with the object of obtaining a selection of Siam with strong straw, irrespective of yield. Should this be found, it is hoped to cross a selection of this type with Siam 29 to obtain the good qualities of this variety together with better straw. Twenty-one localities were visited and seed secured for commencing ear-to-row selection during the 1936-37 season.

Introductions.—Twelve varieties received from Coimbatore unfortunately arrived somewhat late in the season, and then proved exceptionally precocious. Very little grain was secured, though enough was harvested to grow G.E.B. 24, T.670, Black Puttu, Rascadam, Varikisannam and Sukadas during the next season.

Pure Lines.—The pure lines of previous selections were continued. Yields were in general higher than those of the previous season. The best yielder was Nachin

11, with an average of 96 grams per plant. Siam 29 and Nachin 66, the pure strains most commonly planted by local cultivators, gave respectively 73.5 and 76.3 grams per plant.

Varietal Trials.—The varietal trials consisted of two Latin Squares, one occupied by five strains of the short-term Radin Siak, the other by four long-term varieties. The Radin Siak Square was unfortunately situated on land which is liable to flooding and which is somewhat uneven in fertility. On statistical analysis R.S. 17 appears just significantly better than R.S. 25; otherwise the Square yielded little information as to which of these selections is the best. The long-term Square was laid down primarily to compare two Milek Puteh strains, one from Titi Serong, the other a Malacca selection, and to compare their yields with two of the most generally satisfactory Malacca varieties, Siam 29 and Nachin 66. Both the Milek Puteh strains yielded satisfactorily and were significantly superior in yield to Nachin 66. Results are recorded below in Table XXXII.

Table XXXII.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
R.S. 34 ...	15.8	Sm. 29 ...	17.0
R.S. 69 ...	16.5	N. 66 ...	15.1
R.S. 25 ...	14.7	Mk.P. 148 ...	19.1
R.S. 24 ...	17.1	Mk.P. 9 ...	18.6
R.S. 17 ...	17.4		
Mean	16.3	Mean	17.4
S.D. 1.62 lbs. (10% of mean) M.S.D. 2.4 lbs.		S.D. 0.99 lb. (5% of mean) M.S.D. 1.7 lbs.	

JOHORE.

All Plots in Johore were utilized for the first time during the 1935-36 season. Consequently, work was confined to the growing of blocks of pure strain and local varieties for purposes of observation. In many cases, bunds had to be re-formed in more suitable positions, and uneven land resulting from this made accurate comparisons in the form of Latin Squares undesirable.

Tangkak Padi Test Plot.

Fourteen varieties, including ten pure strains and four local unselected varieties, were grown. The yields obtained, calculated to a uniform standard of gantangs per acre, are shown below in Table XXXIII.

Table XXXIII.

Variety.	Mean Yield, calculated in gantangs per acre.	Variety.	Mean Yield, calculated in gantangs per acre.
R. 2 ...	361	Sm. (local) ...	241
R. 7 ...	41 (Serious pest damage)	M.E. 203 ...	325
R.S. 17 ...	428	N. 11 ...	439
R.S. 24 ...	367	N. 66 ...	452
R.S. 34 ...	465	Serendah Kuning (local)	284
Sm. 29 ...	418	Sultan (local) ...	184
Sm. 76 ...	461	Serdang (local) ...	173

Jementah Padi Test Plot.

Yield indications at this Plot are variable; in some instances good crops were obtained, in others, yields were somewhat unsatisfactory. Levelling, alterations to bunds, damage by both drought and flood and extensive pest damage (particularly by borers) tended to obscure the real potentialities of the varieties grown. Results are recorded, calculated in gantangs per acre, in Table XXXIV.

Table XXXIV.

Variety.	Mean Yield, calculated in gantangs per acre.	Variety.	Mean Yield, calculated in gantangs per acre.
M.E. 203 ...	315	Sm. 29 ...	350
R. 2 ...	344	Lembut Tembiling (local)	451
N. 11 ...	83	Nachin Puteh ... (local)	216
N. 66 ...	232	Serendah Puteh ... (local)	177
R.S. 24 ...	33	Serendah Kuning (local)	337
R.S. 17 ...	152	Sm. 76 ...	389
R.S. 34 ...	191	R. 7 ...	126

Tenglu Padi Test Plot.

Lack of water control at this Plot adversely affected results, and *Nymphula* and stem-borers were responsible for a fair amount of damage. Rat damage was not serious, but wild pigs were troublesome. Mean yields calculated in gantangs per acre are shown in Table XXXVI.

Table XXXVI.

Variety.	Mean Yield, calculated in gantangs per acre.	Variety.	Mean Yield, calculated in gantangs per acre.
N. 66 ...	255	Rokat ...	105
Lantek ...	228	S.K. 146 ...	101
Sm. 29 ...	176	R.S. 17 ...	90
R. 4 ...	159	M.E. 203 ...	84
Trengganu ...	155	R.S. 24 ...	73
R.S. 34 ...	152	S.K. 52 ...	68
S.K. 36 ...	122	S.K. 48 ...	37
R. 2 ...	108		

PAHANG.

Temerloh Padi Test Plot.

On the whole the season was fairly satisfactory at this Plot. Pest damage was negligible during the growth period, though some damage was caused by birds and wild pigs during the earing and ripening stages. Owing to variation in water-depth, ripening and harvest were irregular. Lodging of Milek Kuning 2, Siam 29 and of the local variety Seri Ayer occurred as the land was under 1 to 3 feet of water at harvest. At the end of the season the Plot was abandoned in favour of a more suitable locality.

Selection.—Eight types of local padi (Seri Bumi, Milek Kuning, Gansar Melor, Gansar Jeleba, Gansar Halus, Milek Merah, Gansar Jebah and Manchar Kasar), were planted in lines of 500 plants each. On ripening, they were found to be a very mixed lot. They were sorted and a total of twenty-five types selected for further examination during the next season.

From the Seri Ayer selections of the previous season, fourteen types were selected and planted from ear to row, general data being recorded for the rows.

Introductions.—Observation plots were planted of Floating Padi, Padi Kelantan and Reyong 20. The latter was fairly satisfactory and gave a calculated yield of 319 gantangs per acre.

Varietal Trials.—Siam 29 again appears to be the best variety among those under trial in Latin Squares, with a calculated yield of 567 gantangs per acre against 609 in the previous season.

Results are shown in Table XXXIX.

Table XXXIX.

Square A.		Square B.	
Variety.	Mean Yield per 1/150th acre in lbs.	Variety.	Mean Yield per 1/150th acre in lbs.
Mk.K. 3 ...	11.9	N. 66 ...	7.6
Mk.P. 11 ...	2.9	M.E. 203 ...	7.6
Mk.K. 2 ...	5.0	Sm. 76 ...	12.1
Mk.P. 4 ...	6.6	Sm. 29 ...	20.4
Mean	6.6	Mean	11.9
S.D. 2.79 lbs. (42.2% of mean) M.S.D. 4.8 lbs.		S.D. 1.44 lbs. (8.2% of mean) M.S.D. 2.5 lbs.	

Square C.		
R.S. 34 ...	16.9	As one plot of Ser. 875 was not planted, no analysis of this Square was made.
Ser. 875 ...	10.3 (3 plots)	
R.S. 24 ...	4.3	
F.S. 12 ...	10.0	
Mean	10.4	

Dong Padi Test Plot.

Although pest damage was negligible, less favourable weather conditions, together with considerable lodging shortly before harvest, resulted in lower yields than in the previous season. Results are shown in Table XL.

Table XL.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Mk.K. 3 ...	24.0	Mk.K. 2 ...	21.2
N. 11 ...	21.1	Sm. 29 ...	22.5
N. 66 ...	18.6	Mk.P. 11 ...	20.7
Rey. 20 ...	16.8	Mk.P. 9 ...	19.0
Sm. 29 ...	19.6	Mk.P. 148 ...	18.9
Mean	20.0	Mean	20.5
S.D. 1.67 lbs. (8.3% of mean) M.S.D. 2.4 lbs.		S.D. 2.79 lbs. (7.3% of mean) M.S.D. 4.1 lbs.	

Square C.		Square D.	
N. 756 ...	14.0	R.S. 17 ...	13.9
M.E. 203 ...	16.5	R.S. 18 ...	12.5
R.C. 4 ...	20.7	R.S. 24 ...	14.2
Sm. 29 ...	23.0	R.S. 34 ...	12.4
Mean	18.5	Mean	13.5
S.D. 1.6 lbs. (8.6% of mean) M.S.D. 2.8 lbs.		S.D. 1.70 lbs. (12.5% of mean) M.S.D. 2.9 lbs.	

Table XL (*Contd.*)

Square E.		
Variety.	Mean Yield per 1/120th acre in lbs.	
Mk.K. 3 ...	26.0	
Terong Papan (local) ...	17.7	
Serendah Puteh (local)	19.2	S.D. 3.33 lbs. (17.2% of mean)
Serendah Kuning (local)	19.0	M.S.D. 5.8 lbs.
Mean	20.7	

Kuala Lipis Padi Test Plot.

An unsatisfactory season was experienced at this Plot. Transplanting was delayed by dry weather and water shortage. Afterwards the short term varieties were damaged by flood. Growth was therefore very uneven and much supplying was necessary. As most of the main tillers were destroyed, the crop was harvested mainly from secondary tillers, and the results do not fairly indicate the capabilities of the varieties grown.

Jintan Merah, Gansar Tembiling Merah, Milek Puteh 148 and Nachin 11 appeared the most susceptible to flood damage.

The results of eight Latin Squares are shown in Table XLI.

Table XLI.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Mk.K. 3 ...	10.9	Mk.K. 2 ...	7.5
Jintan Merah ...	1.5	Mk.K. 3 ...	14.7
Gansar Tembiling Merah ...	2.7	S.K. 36 ...	10.6
Gansar Tembiling Puteh ...	4.8	R. 13 ...	11.4
Mean	5.0	Mean	11.0
Not analysed.		S.D. 1.12 lbs. (10% of mean) M.S.D. 1.9 lbs.	

Table XLI (*Contd.*)

Square C.		Square D.	
Variety.	Mean Yield per 1/150th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
M.E. 210 ...	11.0	Mk.P. 9 ...	12.6
M.E. 203 ...	10.2	Mk.P. 7 ...	10.1
Sm. 29 ...	16.4	Sm. 29 ...	15.6
Sm. 76 ...	9.5	M.P. 148 ...	4.6
Mean	11.8	Mean	10.7
S.D. 1.54 lbs. (13% of mean) M.S.D. 2.7 lbs.		S.D. 1.53 lbs. (14.2% of mean) M.S.D. 2.7 lbs.	

Square E.		Square F.	
N. 11 ...	4.5	Mk.P. 9 ...	7.1
R. 2 ...	6.7	N. 27 ...	8.2
N. 66 ...	14.1	Kelantan ...	5.9
Rey. 20 ...	16.5	R.S. 24 ...	6.4
Sm. 29 ...	15.0		
Mean	11.4	Mean	6.9
S.D. 1.2 lbs. (10.5% of mean) M.S.D. 1.7 lbs.		Not analysed.	

Square G.		Square H.	
R.S. 24 ...	8.6	F.S. 12 ...	10.5
R.S. 34 ...	9.6	F.S. 875 ...	10.4
R.S. 17 ...	7.4	Sm. 29 ...	16.5
R.S. 18 ...	6.9	N. 756 ...	10.1
Mean	8.1	Mean	11.9
S.D. 1.39 lbs. (17.2% of mean) M.S.D. 2.4 lbs.		S.D. 2.64 lbs. (22.1% of mean) M.S.D. 4.6 lbs.	

Bawang Padi Test Plot.

The initial season at this new Plot was satisfactory. *Nymphula* was responsible for considerable damage at one stage of growth, and slight damage was caused by birds and wild pigs. No explanation of the very variable yields is given in the report on this Station.

The results of the seven Latin Squares are shown below in Table XLII.

Table XLII.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
R. 13 ...	5.0	Mk.K. 3 ...	3.9
R. 2 ...	9.4	Mk.P. 11 ...	3.3
M.E. 210 ...	4.7	Mk.P. 4 ...	4.4
Mk.K. 3 ...	6.0	Mk.K. 2 ...	3.1
Mean	6.3	Mean	3.6
Not analysed.			

Square C.		Square D.	
N. 756 ...	9.6	S.B. 15 ...	2.7
N. 27 ...	5.8	S.K. 48 ...	4.6
Ser. 824 ...	7.7	Seri Bumi ...	10.0
Sm. 29 ...	9.0	S.K. 36 ...	2.6
Mean	8.0	Mean	5.0
Not analysed.			

Table XLII (*Contd.*)

Square E.		Square F.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
R.S. 34 ...	10.5	Sm. 76 ...	12.9
R.S. 18 ...	9.5	N. 66 ...	14.6
R.S. 24 ...	12.8	Mk.K. 3 ...	16.9
R.S. 17 ...	10.7	Sm. 29 ...	12.1
Mean	10.9	Mean	14.1
S.D. 2.2 lbs. (20% of mean) M.S.D. 3.8 lbs.		S.D. 2.4 lbs. (17% of mean) M.S.D. 4.2 lbs.	

Square G.		
N. 27 ...	5.5	
R.S. 24 ...	9.1	
R.S. 17 ...	8.8	S.D. 1.1 lbs. (14% of mean)
R.S. 18 ...	7.7	M.S.D. 1.9 lbs.
Mean	7.8	

Sungei Blat Padi Test Plot.

This Plot, utilized for the second time during the season under review, is situated on land recently cleared from swamp jungle. Consequently, there are still stumps and logs on the ground and the soil is very uneven. Results, therefore, lack uniformity. For the second season Siam 29 again appears to be generally the most satisfactory variety on the Plot.

Results are shown in Table XLIII.

Table XLIII.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Sm. 29 ...	14.6	Mk.K. 3 ...	6.2
N. 66 ...	10.3	Mk.K. 2 ...	5.2
Mk.P. 11 ...	10.6	Mk.P. 148 ...	5.8
Mk.P. (local) ...	12.7	Kelantan (local)	2.8
Mean	12.0	Mean	5.0
Yields too irregular for analysis.			

Square C.		Square D.	
Mk.K. 2 ...	7.0	R. 13 ...	4.1
Mk.P. 148 ...	5.5	Rey. 20 ...	10.1
Kelantan (local)	1.9	Sm. 29 ...	7.3
Mk.K. 3 ...	7.9	M.E. 203 ...	3.0
Mean	5.6	Mean	6.1
Yields too irregular for analysis.			

Square E.		Square F.	
M.E. 203 ...	10.2	Rey. 20 ...	9.0
Rey. 20 ...	8.1	R. 13 ...	9.4
R. 13 ...	9.5	Sm. 29 ...	13.5
Sm. 29 ...	13.1	M.E. 203 ...	9.8
Mean	10.2	Mean	10.4
S.D. 0.94 lb. (9.2% of mean) M.S.D. 1.6 lbs.		S.D. 2.09 lbs. (20% of mean) M.S.D. 3.6 lbs.	

Table XLIII (*Contd.*)

Square G.		Square H.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Mk.P. (local) ...	7.9	N. 66 ...	8.6
Sm. 29 ...	8.4	Mk.P. 11 ...	11.5
N. 66 ...	9.6	Mk.P. (local) ...	13.9
Mk.P. 11 ...	5.6	Sm. 29 ...	11.1
Mean	7.9	Mean	11.2
Not analysed.			

Pekan Padi Test Plot.

The crop was very heavily flooded at harvest, reaping taking place with 5 to 6 feet of water on the plot. Losses amounted in some cases to 50 per cent. of the total, thus rendering results of little value. Mean yields only are recorded in Table XLIV.

Table XLIV.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Sm. 29 ...	2.4	Sm. 29 ...	5.0
M.E. 210 ...	1.5	Mk.P. 7 ...	3.8
M.E. 203 ...	1.0	Mk.P. 4 ...	4.6
Rey. 20 ...	1.6	Mk.P. 11 ...	4.3
Mean	1.6	Mean	4.4

Table XLIV (*Contd.*)

Square C.		Square D.	
Variety.	1/120th acre in lbs. Mean Yield per	Variety.	Mean Yield per 1/120th acre in lbs.
Sm. 29 ...	6.4	Sm. 29 ...	7.1
Mk.K. 2 ...	4.3	N. 66 ...	4.7
Mk.K. 3 ...	7.5	Sm. 76 ...	5.6
F.S. 12 ...	2.4	N. 756 ...	2.7
Mean	5.1	Mean	5.0

Square E.		Square F.	
R.S. 24 ...	4.7	Anak Terus ...	6.5
R.S. 18 ...	3.3	Seri Ayer ...	5.2
R.S. 34 ...	5.8	Seri Bumi ...	5.7
R.S. 17 ...	5.3	Sm. 29 ...	8.8
Mean	4.8	Mean	6.5

KELANTAN.

Central Experiment Station.

The varietal trials consisted of a six-way Latin Square for dry padi, a randomized block containing seven varieties of dry padi, two six-way and two four-way Latin Squares for wet padi. Plot B, particularly the variety Jintan Koring, suffered losses from bird damage. Plots C and D were manured with bat guano at the rate of 360 lbs. per acre.

Results are shown in Table XLV.

Table XLV.

Square A. (Dry Padi)		Square B. (Dry Padi)	
Variety.	Mean Yield per 1/80th acre in lbs	Variety.	Mean Yield per 1/80th acre in lbs
Jintan Koring ...	17.9	Jintan Koring ...	10.0
Jintan Manis ...	18.0	Kaki Merpati 2	17.0
Sa Bumi Puteh ...	22.9	K.M. 3 ...	21.0
Padang Serai ...	20.0	K.M. 5 ...	21.2
Kaki Merpati ...	22.9	Padang Serai 13	18.1
Anak Lebah ...	18.7	K.M. 19 ...	19.2
		K.M. 21 ...	20.6
Mean	20.1	Mean	18.2
S.D. 2.64 lbs. (13.2% of mean) M.S.D. 3.4 lbs.		No analysis made owing to unsatisfactory lay-out.	

Square C.		Square D.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
R. 13 ...	19.7	S.B. 15 ...	26.5
R. 2 ...	11.8	M.E. 203 ...	22.5
N. 66 ...	15.9	S.K. 48 ...	22.4
Sm. 76 ...	17.2	R. 2 ...	19.2
Sm. 29 ...	22.7	S.K. 36 ...	27.5
N. 27 ...	13.7	R. 4 ...	25.3
Mean	16.8	Mean	23.9
S.D. 3.18 lbs. (18.9% of mean) M.S.D. 4.1 lbs.		S.D. 1.91 lbs. (8% of mean) M.S.D. 2.5 lbs.	

Table XLV (*Contd.*)

Square E.		Square F.	
Varietv.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
R.S. 7 ...	20.5	Padang Trengganu (unselected) ...	17.2
R.S. 17 ...	19.4	P.T. 2 ...	18.2
R.S. 18 ...	19.3	P.T. 4 ...	18.2
R.S. 24 ...	19.6	P.T. 5 ...	20.4
Mean	19.7	Mean	18.5
No significant differences.		S.D. 0.99 lb. (5.3% of mean) M.S.D. 1.7 lbs.	

Pasir Puteh Padi Test Plot.

The varieties in the trial plots suffered more or less severe lodging as a result of a storm a few days before harvest. Siam 29 and Nachin 66 suffered most severely and Radin 13 and 4, Nachin 765 and Serendah 824 the least.

Results are shown in Table XLVI.

Table XLVI.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
N. 756 ...	13.6	R. 4 ...	18.1
Ser. 824 ...	19.8	Sm. 76 ...	18.1
Sm. 29 ...	19.5	Sm. 29 ...	17.2
N. 66 ...	20.2	R. 13 ...	18.9
Mean	18.3	Mean	18.1
S.D. 1.25 lbs. (6.8% of mean) M.S.D. 2.2 lbs.		S.D. 1.1 lbs. (6.1% of mean) M.S.D. 1.9 lbs.	

Table XLVI (*Contd.*)

Square C.		Square D.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Serendah ...	19.2	Chateh ...	18.6
Sm. 29 ...	16.5	Sm. 29 ...	15.2
Nalong ...	20.5	Anak Ikan Tinggi ...	6.5
Manik Siam ...	21.2	Anak Ulat ...	18.3
Padang Trengganu	19.8	Anak Naga ...	12.4
Mean	19.4	Mean	14.2
S.D. 1.43 lbs. (7.4% of mean) M.S.D. 2.1 lbs.		S.D. 2.83 lbs. (20% of mean) M.S.D. 4.1 lbs.	

BRUNEI AND LABUAN.

Work on the four new Test Plots, Berakas, Bukit Kallam, Kuala Abang and Lumapas was confined to preparation of land and the planting of a few varieties of padi in observation blocks. There are no results to be recorded from these Plots.

At Kilanas Padi Test Plot, six Latin Squares were planted and the results are recorded in Table XLVII.

Table XLVII.

Square A.		Square B.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
S.B. 15 ...	18.2	R. 2 ...	7.8
Jonkok ...	18.9	Jonkok ...	4.8
S.K. 48 ...	17.2	R. 4 ...	7.6
S.K. 36 ...	19.9	R. 13 ...	7.6
Mean	18.3	Mean	6.9
S.D. 1.81 lbs. (9.8% of mean) M.S.D. 3.1 lbs.		Not analysed.	

Table XLVII (*Contd.*)

Square C.		Square D.	
Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Rey. 6 ...	13.4	Sm. 29 ...	21.3
Rey. 20 ...	13.8	Sibahit ...	10.0
M.E. 80 ...	7.0	N. 66 ...	17.0
M.E. 88 ...	12.0	Sm. 76 ...	19.0
Mean	11.5	Mean	16.8
Uneven yields. Not analysed.		S.D. 1.4 lbs. (8.3% of mean) M.S.D. 2.4 lbs.	

Square E.		Square F.	
R.S. 7 ...	18.0	Rey. 6 ...	15.5
R.S. 17 ...	17.6	Rey. 20 ...	16.1
R.S. 18 ...	15.9	M.E. 80 ...	11.0
R.S. 24 ...	12.7	M.E. 88 ...	14.9
Mean	16.0	Mean	14.4
S.D. 2.72 lbs. (17% of mean) M.S.D. 4.7 lbs.		S.D. 2.24 lbs. (15.5% of mean) M.S.D. 3.9 lbs.	

Summary.

This report summarizes the varietal trials and selection work carried out on padi during the 1935-36 season. In the summary of the report on the 1934-35 season* an outline of the general position was given. Certain modifications are necessary in view of results obtained during the season under review and the general position is therefore brought up to date in the summary given below.

* See *Malayan Agricultural Journal*, Vol. XXIV, No. 2, February, 1936, pp. 83-85.

The season was unsatisfactory at many of the Test Plots, unfavourable weather and pests being responsible for results so uneven that they were not considered worth statistical treatment. Figures from such Plots are included in the summary for departmental reference, but it should be understood that they do not, in most instances, represent the true capabilities of the given strains at the localities in question.

Krian.

In North Krian, further trials have not altered the previous opinion that Seraup Kechil 48 is a satisfactory strain for the soft land and deep water of the area. The selections Seraup Kechil 146 and 371 do not yet appear, on the information obtained, to be sufficiently superior to this strain to warrant their general distribution.

In Southern Krian, trials with Siam 29 on "ketua plots" (demonstration plots on land owned by *ketua*—headmen) have shown that the previously expressed opinion on the suitability of this variety to local conditions was incorrect. The variety proved unpopular owing to the comparatively low weight-volume ratio, a factor of importance in a district where much of the crop is sold by weight, and to the weak straw which lodges readily and is liable to rot under wet harvesting conditions rendering harvesting more difficult and costly. As an adequate supply of irrigation water is now available in South Krian, it is reported that there is a tendency to plant longer-maturation varieties, such as the Seraups which are popular in North Krian, because of their heavier yield of grain. It is probable, however, that Siam 29 may find a limited use for domestic purposes as the rice obtained is reputed to be superior to that of the Seraups.

Kedah.

In this State the position remains practically unaltered. Results of the 1935-36 season confirm the previous opinion that, according to locality, one of the six varieties Chubai 18, Mayang Ebus 88, Radin Che Nah 28, Radin China 4, Radin China 17 or Reyong 20 may be confidently recommended to the planter. Selection of new strains in the hope of finding something even better is proceeding at the Experiment Station at Telok Chengai.

Malacca.

For general planting Siam 29 and Nachin 66 still remain the most popular and satisfactory varieties. Further trials with Radin Siak varieties, useful in limited areas where the season is shorter than normal or where only a limited water supply is available, have failed to show which of the four final selections is the best. In fact, there appears to be little to choose between them.

Province Wellesley.

The two varieties mentioned in the previous report, Siam 29 and Mayang Ebus 203 have again been satisfactory and Mayang Ebus 210 may now be added

as a likely selection for areas where the land is not excessively rich and soft or the water deep. Further trials are, however, necessary before it is safe to make definite recommendations.

Other Localities.

In localities other than those mentioned above, no definite recommendations can be made until results over a longer period are available for review. In most localities, except those where wet harvesting conditions are usual, it appears that Siam 29 is probably the best yielding and most popular variety, but more extensive trial against local varieties and other selections is necessary.

PADI MANURIAL AND MINOR CULTURAL TRIALS 1935 - 1936

Compiled by
R. G. H. WILSHAW,
Rice Research Chemist.

Standard Experiments.

During the 1935-1936 season, in addition to a few small manurial and cultivation trials, three standard manurial experiments have been carried out at different Stations in Perak, Province Wellesley and Malacca. These three manurial trials, laid out as follows are, for the sake of brevity, subsequently referred to as Normal Phosphate, Heavy Superphosphate and Heavy Rock Phosphate Dust Trials.

Normal Phosphate Trial.—A 4 x 4 Latin Square, 1/120th acre plots receiving the following treatments:—

(1) A proprietary brand of complete fertilizer—at the rate of 2 piculs per acre.
(2) Rock phosphate dust—at the rate of 1 cwt. per acre.
(3) Superphosphate—at the rate of 1 cwt. per acre.
(4) Control—no manure.

Designed to test responses to low level dressings of phosphate, and to afford a comparison between a proprietary brand and the usual rock and superphosphate. The proprietary brand had the composition:—

	per cent.
Nitrogen	7
Phosphate	14
Potash	1

Heavy Rock Phosphate Dust Trial.—A 4 x 4 Latin Square, 1/360th acre plots receiving the following treatments:—

(1) Control—no manure.
(2) 16 cwt. rock phosphate dust per acre.
(3) 32 cwt. rock phosphate dust per acre.
(4) 48 cwt. rock phosphate dust per acre.

Designed to test the effect of extremely high phosphate dressings, and to ascertain whether, by this method, yields could be raised to any extent beyond the 'bar',* either in the year of application or in subsequent seasons, when the slow liberation and utilization of phosphate might be evidenced in high residual effects.

Heavy Superphosphate Trial.—A 4 x 4 Latin Square, 1/360th acre plots receiving the following treatments:—

(1) Control—no manure.
(2) 16 cwt. superphosphate per acre.
(3) 32 cwt. superphosphate per acre.
(4) 48 cwt. superphosphate per acre.

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* *Malayan Agricultural Journal,* Vol. XXII, p. 583, December, 1934.

Designed for the same purpose as the Heavy Rock Phosphate Dust Trial.

The complete set of manurial and cultivation trials follows.

Normal Phosphate Trials.

These trials were carried out at:—

Selangor	Kuang
Perak	Kuala Kurau
	Bagan Serai
	Briah
	Sungei Kepar
	Selinsing
	Titi Serong
	Talang
Province Wellesley	Bukit Merah
Malacca	Pulau Gadong

Descriptions of the soils at these Stations and Test Plots have been published in this Journal.†

At Kuang the trial was a failure due to rats and birds, and no crop was harvested from any plot. With this exception, the yields at the different places are given in Table I.

Table I.

Normal Phosphate Trials.

Mean Yield in lbs. per 1/120th acre.

Station.	Proprietary Brand	Rock Dust	Super	Control
Kuala Kurau ...	32.1	31.6	32.2	31.8
Bagan Serai ...	20.9	20.1	18.2	15.8
Briah ...	17.5	19.6	17.5	18.9
Sungei Kepar ...	19.9	19.6	20.6	19.0
Selinsing ...	17.5	17.8	16.3	14.9
Titi Serong ...	19.6	19.5	17.7	17.9
Talang ...	30.7	29.1	29.3	30.0
Bukit Merah ...	17.8	15.5	17.0	12.0
Pulau Gadong ...	25.9	26.7	26.5	25.2

† *Malayan Agricultural Journal,* Vol. XIX, p. 595, December, 1931.
Malayan Agricultural Journal, Vol. XX, p. 618, December, 1932.
Malayan Agricultural Journal, Vol. XXI, p. 629, December, 1933.

Statistical analysis of the yield figures shows that significant increases over the control plots by a manurial treatment were obtained only at Bagan Serai, Selinsing, Titi Serong and Bukit Merah.

The full analyses for these four places are given in Table II:—

Table II.

Bagan Serai

Treatment.	Yield in lbs. per 1/120th acre	
Proprietary brand ...	20.91	S.D. = 1.16 lbs. = 6.2% of general mean.*
Rock phosphate dust ...	20.1	M.S.D. = 2.0 lbs.
Superphosphate ...	18.25	I.C. = 1.6 lbs.
Control ...	15.8	
Mean	18.8	

Selinsing.

Proprietary brand ...	17.5	S.D. = 1.1 lbs. = 6.6% of general mean.
Rock phosphate dust ...	17.8	M.S.D. = 1.9 lbs.
Superphosphate ...	16.3	I.C. = 1.5 lbs.
Control ...	14.9	
Mean	16.6	

Titi Serong.

Proprietary brand ...	19.6	S.D. = 0.97 lb. = 5.2% of general mean.
Rock phosphate dust ...	19.5	M.S.D. = 1.7 lbs.
Superphosphate ...	17.75	I.C. = 1.3 lbs.
Control ...	17.9	
Mean	18.9	

* S.D. = Standard Deviation.
M.S.D. = Minimum Significant Difference.
I.C. = Increase over control plot necessary to attain significance.

Bukit Merah.

Treatment.	Yield in lbs. per 1/120th acre	
Proprietary brand ...	17.8	S.D. = 1.4 lbs. = 9% of general mean.
Rock phosphate dust ...	19.5	M.S.D. = 2.4 lbs.
Superphosphate ...	17.0	I.C. = 1.9 lbs.
Control ...	12.0	
Mean	15.6	

It will be noticed that a high order of uniformity is obtained in all these trials, as reflected in the standard deviation figures expressed as a percentage of the general mean.

The conclusion reached is that though on four out of twelve Stations significant increases were obtained by the use of differing types of phosphatic manures at low application rates, when consideration is paid to the economic side, it will be found that rock phosphate dust costing $30 per ton ex-godown is the only fertilizer at all likely to repay for its application. The figures on which this conclusion is based are a selling price of padi of $1.75 per picul and the market prices of the fertilizers, plus railway freight.

Heavy Rock Phosphate Dust Trials, and Heavy Superphosphate Trials.

Both these trials were carried out at:—

Kedah	Telok Chengai
Province Wellesley	Bukit Merah
Perak	Titi Serong
	Selinsing
	Briah
	Sungei Kepar
	Bagan Serai
	Kuala Kurau
	Talang
	Bruas
Negri Sembilan	Kendong
Malacca	Pulau Gadong

Table III.

Heavy Rock Phosphate Dust Trials.

Mean Yield in lbs. per 1/360th acre.

Station.	Control	16 cwts.	32 cwts.	48 cwts.
Telok Chengai ...	9.4	9.8	10.1	10.4
Bukit Merah ...	6.1	7.75	7.5	7.6
Titi Serong ...	9.25	9.0	8.75	8.44
Selinsing ...	6.6	6.16	6.98	6.94
Briah ...	5.65	5.6	5.84	5.57
Sungei Kepar ...	7.2	7.1	7.5	6.8
Bagan Serai ...	7.94	7.56	7.31	7.6
Kuala Kurau ...	10.1	10.9	10.0	10.6
Talang ...	11.6	11.3	11.0	11.9
Kendong ...	4.75	4.8	3.6	3.75
Pulau Gadong ...	6.7	6.5	6.75	6.25
Bruas ...	1.8	1.7	1.5	2.9

Table IV.

Heavy Superphospate Trials.

Mean Yield in lbs. per 1/360th acre.

Station.	Control	16 cwts.	32 cwts.	48 cwts.
Telok Chengai ...	9.25	9.2	9.05	8.5
Bukit Merah ...	6.6	6.25	6.1	6.2
Titi Serong ...	9.0	8.9	8.6	8.6
Selinsing ...	6.20	6.06	6.36	6.06
Briah ...	5.65	3.90	4.63	4.87
Sungei Kepar ...	6.9	7.3	7.2	7.3
Bagan Serai ...	7.7	7.25	6.6	6.2
Kuala Kurau ...	10.7	11.0	10.8	11.2
Talang ...	10.2	8.8	5.3	3.3
Kendong ...	3.4	4.75	4.9	5.0
Pulau Gadong ...	7.25	8.1	8.3	8.06

At Bruas, the crop was a failure as the plants did not flower, and the superphosphate trial at Briah suffered from bad rat damage. The yields obtained are given in Tables III, IV and V.

The effect of the heavy phosphate dressings is not very noticeable and no special effects of the order sought were obtained.

At three places only, significant differences emerged: at Bukit Merah there was an increase in yield with rock phosphate; at Bagan Serai and Talang there was a decrease in yield with superphosphate.

Detailed analyses are given in Table V:—

Table V.

Bukit Merah.

Treatment.	Mean Yield in lbs. per 1/360th acre.	
Control ...	6.1	S.D. = 0.43 lbs. = 6% of general mean.
16 cwt. rock phosphate dust per acre ...	7.75	M.S.D. = 0.76 lb.
32 cwt. rock phosphate dust „ ...	7.5	I.C. = 0.6 lb.
48 cwt. rock phosphate dust „ ...	7.6	
Mean	7.25	

Bagan Serai.

Control ...	7.7	S.D. = 0.41 lb. = 5.9% of general mean.
Superphosphate 16 cwt. per acre. ...	7.25	M.S.D. = 0.71 lb.
Superphosphate 32 cwt. „ ...	6.6	D.C. = 0.56 lb.
Superphosphate 48 cwt. „ ...	6.2	
Mean	6.95	

Talang.

Control ...	10.2	S.D. = 1.25 lbs. = 18% of general mean.
Superphosphate 16 cwt. per acre. ...	8.8	M.S.D. = 2.2 lbs.
Superphosphate 32 cwt. „ ...	5.3	D.C. = 1.72 lbs.
Superphosphate 48 cwt. „ ...	3.3	
Mean	6.9	

It must be borne in mind that the dressings of phosphate applied in this experiment are exceedingly high and of an order sufficiently great to upset the normal balance of nutrients in the soil. It is surprising when the small working balance of nutrients in these soils is considered, that no more striking results have ensued.

These trials will be continued during the 1936-1937 season for observation on residual effect. It is quite probable that the slow liberation of phosphate from these heavy dressings will not be evidenced for a year or two.

Special Experiments.

In addition to the standard experiments, a number of special experiments were carried out in Kelantan and Pahang.

Central Experiment Station, Kota Bahru.—The programme at this Station consisted of three experiments on dry padi and eight on wet padi. Results and conclusions are as follows:—

DRY PADI.

1. *Seed per Hole Experiment.*

Table VI.

Treatment.	Mean Yield in lbs. per 1/80th acre.	
2 seeds per hole ...	8.4	S.D. = 3.0 lbs. = 35.5% of general mean.
4 seeds per hole ...	11.2	M.S.D. = 3.9 lbs.
6 seeds per hole ...	8.0	
8 seeds per hole ...	9.0	
10 seeds per hole ...	6.6	
12 seeds per hole ...	7.6	
Mean	8.5	

Although treatment B, 4 seeds per hole, reaches significance over E, 10 seeds per hole, there is no general response as indicated by the 'Z' test. Taking this in conjunction with heavy bird damage sustained, no conclusions can be drawn.

2. *Cultivation Experiment.*

Table VII.

Treatment.	Mean Yield in lbs. per 1/60th acre.	
Changkol 1934, plough and harrow 1934 and 1935 ...	15.9	S.D. = 3.6 lbs. = 19.7% of general mean.
Plough and harrow 1934 and 1935 ...	15.4	M.S.D. = 6.2 lbs.
Plough and harrow 1934 late changkol 1935 plough and harrow 1935 ...	23.4	
Mean	18.2	

The effect of changkolling during the season is evident by the significance of treatment C over A and B. No residual effect of the 1934 changkolling is evidenced by comparison of A with B.

3. *Manurial Experiment.*

Rain and birds damaged this experiment to such a heavy extent as to render the results valueless.

WET PADI.

The wet padi experiments consisted of a spacing experiment, one cultivation experiment, and six manurial experiments. Significant differences were obtained only in four of the manurial trials. (Tables VIII—XI).

Table VIII.

Bat Guano.

Treatment.	Mean Yield 1/60th acre. in lbs. per	
1 cwt. bat guano per acre	61.0	S.D. = 3.04 lbs. = 4.6% of general mean.
2 cwt. bat guano per acre	62.1	M.S.D. = 5.3 lbs.
3 cwt. bat guano per acre	68.2	I.C. = 4.2 lbs.
Control	54.0	
Mean	61.3	

All the guano treatments show significant increases over the control, and the heaviest dressing over the two lighter.

Table IX.

Phosporus: Nitrogen Ratio.

Treatment. (in cwts. per acre)		Mean Yield in lbs. per 1/60th acre.	
Super-phosphate	Ammonium sulphate		
2	0	44.4	S.D. = 3.65 lbs. = 7.4% of general mean.
2	1	48.4	
2	2	52.4	M.S.D. = 6.35 lbs.
2	3	52.4	
Mean		49.4	

This experiment confirmed indications obtained in the 1934 experiments, that phosphate alone is an insufficient dressing for this soil, and added nitrogen is required. This conclusion is still further supported by the results of the following experiment repeated from 1934-1935.*

Table X.

Treatment.	Mean Yield in lbs. per 1/40th acre.	
N.P.K. basic ...	68.3	S.D. = 7.0 lbs. = 10.2% of general mean.
Superphosphate ...	63.8	
Super + ammonium sulphate ...	70.4	M.S.D. = 9.0 lbs.
Super + am. sulphate + am. sulphate	78.0	I.C. = 7.3 lbs.
Basic slag + cyanamide ...	72.8	
Control — no manure ...	58.7	
Mean ...	68.6	

A second manurial square with organic fertilizers, also a repetition, gave similar results to the previous season.

* *Malayan Agricultural Journal*, Vol. XXIV., No. 2, p. 90, February, 1936.

Table XI.

Treatment.	Mean Yield in lbs. per 1/40th acre.	
Green manure and guano ...	67.4	S.D. = 7.2 lbs. = 10.9% of general mean.
Green manure, guano and sulphate of potash ...	73.8	M.S.D. = 9.3 lbs.
Bat guano and sulphate of potash ...	62.5	I.C. = 7.5 lbs.
Cow dung ...	70.1	
Baja bakar † ...	66.3	
Control — no manure ...	56.5	
Mean ...	66.1	

Pasir Puteh Test Plot.—Two experiments were laid down at this Station, one manurial, and one nursery. The latter gave no results of value. The former gave results confirming previous findings that a ready response may be obtained on this soil by the application of phosphate manure, and possibly by simple cultivation such as changkolling. (Table XII).

Table XII.

Treatment.	Yield in lbs. per 1/40th acre.	
1 cwt. bat guano per acre ...	58.3	S.D. = 6.3 lbs. = 11.5% of general mean.
2 cwt. bat guano per acre ...	54.4	M.S.D. = 8.1 lbs.
3 cwt. bat guano per acre ...	57.3	I.C. = 6.5 lbs.
5 tons cow dung ...	58.3	
Residual effect of 5 tons green manure from 1934 to 1935 ...	49.0	
Changkolled ...	53.7	
Residual effect 4 cwt. bat guano from 1934 to 1935 ...	57.1	
Control ...	47.0	
Mean ...	54.4	

† A mixture of burnt soil, burnt cow dung, and ashes of coconuts and areca leaves in general use in Kelantan under the name of *baja bakar*.

In Pahang, a series of cultivation experiments for comparison of the practices of tajak, tenggala, melanyak, and changkol were instituted at the various Test Plots throughout the State. Very little positive information was derived from these experiments as in many cases the yields were too variable, and in other cases no significant differences were obtained.

Subsidiary Experiments.

Small subsidiary experiments on cultivation and manuring were carried out at Pulau Gadong, Kendong, Ampang Tinggi, Kuala Klawang, but gave no results of any value.

At Titi Serong, subsidiary experiments in connexion with the clearing of the bendangs and the disposal of straw afforded no information.

At Briah, however, in a cultivation experiment, changkol versus tajak, although negative to the 'Z' test, the mean difference reached the level of significance. (Table XIII).

Table XIII.

Treatment.	Yield in lbs. per 1/20th acre.	
Changkol	19.2	S.D. = 2.2 lbs. = 12% of general mean.
Tajak ...	17.5	M.S.D. = 1.1 lbs.
Mean	18.35	

At Selinsing, the cultivation and manuring experiment which was reported on last year,* was replanted for observation of residual effects. The results obtained are given in Table XIV.

Table XIV.

Cultivation and Manuring Experiment at Selinsing Station.

Mean Yield in lbs. per 1/80th acre.

Treatment.	Control	P	N.P.	Mean
Changkol ...	21.8	23.25	23.05	22.7
Tajak ...	19.7	21.4	20.35	20.5
Mean	20.76	22.3	21.7	

* *Malayan Agricultural Journal*, Vol. XXIV, No. 2, p. 87, February, 1936.

The analysis table is as follows:—

		D.F.	$\leq d^2$	V.	S.D.
Total		23	96.7		
Between blocks	...	1	3.9		
Between cultivation treatments	...	1	30.1		
Between manures	...	2	9.8		
Interaction	...	2	0.8		
Residue (Error)	...	17	52.1	3.06	1.93

M.S.D. between cultivation means = 1.7 lbs.

M.S.D. between manurial means = 2.1 lbs.

As was found last season the land is of reasonably uniform fertility. There remains a significant effect due to cultivation but not to manures.

Summary.

In summarizing the results of experiments this season, it might perhaps be opportune to review in broad outline the position which has now been reached with padi manurial trials.

Previous to 1930 there were indications that phosphatic fertilizers would give increased yields. Experiments on three Stations in 1931 hardly confirmed this, but since then, the abundance of evidence points to the fact that increases can be obtained with phosphatic manures, though the proposition is likely to be uneconomic if the usual phosphatic fertilizers are employed. Results this season, however, show the possibility of rock phosphate dust being an economic fertilizer in certain districts.

Nitrogen in the usual forms is unlikely to give increases and is certainly not economic, and in combination with phosphate, normally gives no added increase over phosphate alone.

During 1933 and 1934 efforts were made to obtain increased yields by combining manuring with close planting, with green manuring, and with surface cultivations of various types. No substantial increases, however, were obtained, nor was any clue found which would suggest a solution to the problem of raising yields above the 'bar'* frequently referred to in previous papers.

The heavy phosphate experiments carried out this season were aimed at obtaining a clue to the same problem, but no immediate information has been gained.

* *Malayan Agricultural Journal*, Vol. XXII, p. 583, December, 1934.

It is interesting to note that in the results of pot culture experiments with padi, recently published,† heavy dressings of phosphate had a depressing effect on yield, and it was concluded that the optimum dressing was of the order of 10 cwt. per acre.

In the same publication, the results with insoluble forms of nitrogen suggest that the use of ground horn might give yields well above the 'bar'. For next season, experiments have been laid down to test this under field conditions, and to give indications as to its economic possibilities.

† *Malayan Agricultural Journal*, Vol. XXIV, p. 309, *et seq.* July, 1936.

Abstract.

INTERNATIONAL GROCERS' EXHIBITION 1936.*

The Fortieth Annual International Grocers' Exhibition was held at the Royal Agricultural Hall, Islington, from 19th to 25th September, 1936.

Malaya was represented for the ninth year in succession, other Government participants being Canada, South Africa, Australia, New Zealand, India, the Irish Free State, and the National Mark and Marketing Board Schemes of the Ministry of Agriculture.

In previous years the Malayan stand has been situated in the Annexe known as Gilbey Hall, where space is cheaper than in the main building. But stands there are rather remote and not all who perambulate the main exhibits see them. One of the main stands was taken as an experiment this year, the higher rates being compensated by reducing the space occupied. The change was an unqualified success; the stand received more attention and was busier with inquiries than on any previous occasion.

The Malayan display, which was based on a pineapple diorama made by Mr. F. de la Mare Norris, late of the Malayan Department of Agriculture, consisted chiefly of canned pineapples under more than a score of varied labels, in sizes ranging from 1 lb. to 5½ lbs., and comprising the cuts: midget cubes, cubes, chunks, spiral slices, and round-cut slices. Of the minor products exhibited those which aroused most interest were the samples of tapioca displayed in presentation packets of cellophane.

Both the grades of canned pineapple sold on the Home market were displayed. The quality of the "Golden" opened on the stand was very good indeed. The "G.A.Q." might be described as passable, the chief defect being as usual the presence of unripe, woody and fibrous fruit. Generally speaking both grades were superior in quality to those shown in 1935.

The stand gave the trade an opportunity to see Malayan canned pineapple of good quality and provided what may perhaps prove in some measure an antidote to the bad impression created by the very inferior shipments during the summer.

Trade inquiries were very numerous. As many of them related to orders too small for the firms from which the Agency obtains its exhibition supplies to handle, the direct results cannot be assessed. But one incident may be cited. A representative of one of the larger direct importers of Malayan pines mentioned to the demonstrator that his firm wished to arrange a Continental agency. Almost the next inquirer was an important Amsterdam merchant who, after having examined the contents of various tins, stated that although his firm had hitherto handled only Hawaiian pines he would like to secure an agency for Malayan pines. The two inquirers were introduced to each other and the Agency was subsequently

* Abstracted from a Report received from the Agent, The Malayan Information Agency, London.

informed that a satisfactory connexion was being arranged. One single fresh outlet of this nature might well justify the entire cost of the stand, provided that care is taken to maintain the quality of the pack.

The increased interest taken in the Malayan stand can be attributed partly to the advertising campaign which the Agency has been carrying out this year with funds furnished by the Pineapple Packers' Agency and the Johore Government. All the leading grocery trade publications have carried advertisements addressed to retailers, and all the leading household publications in the country have contained advertisements addressed to the house-wife. The large majority of these publications also made appreciative editorial references in the trade papers, to the improvement in the Malayan industry, and in the popular publications, to the use of pineapples in cooking, etc. It was most disappointing to find as this campaign proceeded that it was synchronizing with the arrival in England of shipments which were much below the standard of those despatched during recent years.

Review.

Diseases and Pests of the Rubber Tree.

By Arnold Sharples. A.R.C.Sc., D.I.C., *Late Head of the Pathological Division, Rubber Research Institute of Malaya, and formerly Government Mycologist, Department of Agriculture, S.S. and F.M.S. Macmillan & Co. Ltd., London, 1936. Price 25 shillings.*

Since the publication of Petch's standard work on the diseases and pests of the rubber tree, considerable progress has been made in the study of the principal diseases affecting this important crop, and the need for a more up-to-date book on the subject has been felt for some time.

In view of his close connexion with the subject, over a long period, in the principal rubber-producing country of the world, Mr. Sharples is undoubtedly well qualified to undertaken the task of writing such a book, and in the volume now published by Messrs. Macmillan & Co. Ltd., London, he has made a valuable addition to the growing series of hand-books dealing with diseases of the major tropical crops.

Publication of the book at the present juncture should be welcomed by the rubber planting communities in the East on account of the problems arising in connexion with replanting of old rubber areas with selected high-yielding material. These problems are discussed at length, and valuable recommendations are made relating to early prophylactic measures against the major root diseases. In addition, the question of forestry methods of cultivation receives full consideration.

The book is divided into three Parts, of which Part I is devoted to general remarks on plant diseases and on the structure, reproduction and physiology of fungi. Part II gives an account in simple terms of the anatomy of woody plants and the functions of the different tissues. These two parts could well serve as a text book in elementary structural and physiological botany of woody plants for candidates for the local I.S.P. certificate. Further anatomical details are included in a portion of Part III where the author gives an account of the adequate repair mechanism possessed by the rubber tree in the regeneration of bark tissues after wounding. This account is taken from the paper, by Sharples and Gunnery, published in the *Annals of Botany* in 1933.

Part III provides information on all the diseases and pests hitherto recorded on the rubber tree, with full discussions of the outside factors which render the trees liable to attack by facultative parasites. The damage caused by lightning and the after effects of bark scorching are described in detail in a chapter well worth study by phytopathological workers in countries where lightning storms are frequent.

The section on insect pests, which deals with "white ants," boring beetles, cockchafer grubs, and other insects of lesser importance, is followed by a chapter

on fungicides and disinfectants, which is of particular interest and makes clear the present position with regard to the use of these substances in combatting disease in the rubber tree.

The chapters on root diseases are perhaps the most important in the book. The author, accepting the conclusions reached by Napper that the centres of infection are "knots" of jungle tree infection already delimited at the time of felling, outlines methods of early treatment of newly planted areas for the control, not only of *Fomes lignosus*, which becomes evident in the earlier years, but also of *Ganoderma pseudoferreum* which takes longer to reach its maximum intensity but nevertheless may be present, and can be treated, in the early years of growth.

Every rubber planter is aware of the difficulties experienced in treating root disease and of the expense incurred in isolating infected areas in mature rubber. Any economical measures likely to prevent root diseases from appearing in areas replanted with valuable high-yielding material are worthy of consideration. In this respect the methods summarized on pages 137-139 with regard to *F. lignosus* should, if adopted, do much to protect the trees from subsequent attack by any root disease, so that areas which later might require trenching should be small both in extent and number, and expenditure on root disease treatment should be comparatively small.

Referring to the fungus *Rhizoctonia bataticola* which attained prominence in Ceylon some years ago as a result of Small's claims that this fungus was of primary importance in cases of root diseases of rubber and many other plants, the author gives convincing evidence that root diseases of the rubber tree, in Malaya, spread by root contact, and that the fungus *R. bataticola* is not associated with these diseases either in a primary or even a secondary capacity.

The final chapter (Chapter XXI) is headed "Forestry Methods of Cultivation." The "pros" and "cons" of this somewhat controversial subject are given, mainly from the phytopathological aspect. While the author is in full agreement with the fundamental principles which form the basis of the forestry method *i.e.* shading of the soil, prevention of erosion and supply of a suitable type of humus, he is critical of a system which advocates unrestricted freedom of natural undergrowths, coupled with selective weeding and repopulation of open spaces by self-sown seedlings. He considers that "the adoption of *controlled* forestry methods in any area, so improving the soil in readiness for the time when systematic replanting with high grade material can be undertaken, seems to offer valuable possibilities ..... where the undergrowth is controlled so that growth in height is not allowed to exceed twelve to eighteen inches, substantial benefits may be derived in areas from which mouldy rot is absent."

With regard to mouldy rot, the author cites an instance where the disease could not be controlled by ordinary methods, due to the increased humidity induced by forestry methods.

The author considers that attempts to bud-graft self-sown seedlings in a stand of mature rubber of inferior grade should be abandoned in favour of complete repopulation with superior material, and explains clearly the reasons, partly con-

nected with the labour force on estates, why he does not favour any schemes designed to substitute "kampong" conditions for "estate" conditions in Malayan rubber plantations.

The Appendix contains a list of fungi recorded on rubber trees in Malaya. There are certain omissions from this list *e.g. Oidium heveae* and *Phytophthora heveae*, while *P. faberi* is listed instead of *P. palmivora* and *Fomes pseudoferreus* instead of *Ganoderma pseudoferreum*.

The author is to be congratulated on providing planter and scientist with an up-to-date, comprehensive account of the diseases and pests affecting *Hevea Brasiliensis*, and of methods for their control. The book, which is well illustrated (the coloured plate of Pink Disease is particularly good) should serve for many years as the standard work on this important subject.

A. T.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports from Agricultural Officers.

November, 1936.

The Weather.

The comparatively cool, dull weather, with high precipitation, usual for November, prevailed generally throughout the country during the month.

In Kedah, Province Wellesley and over most of the inland areas of Perak, rainfall was below normal during the first three weeks of the month, but heavy precipitation during the last week will probably bring the total rainfall figures near the average for the month. A slightly sub-normal precipitation is indicated for the inland areas of Selangor, the Kuala Pilah District of Negri Sembilan and the Segamat area of Johore.

The heavy rainfall in Malacca and adjoining areas in Negri Sembilan and in Muar, Johore, noted last month, continued during November, and the precipitation for these areas is again above average for the month.

Similarly, precipitation in excess of normal is recorded for Singapore and in the Johore Bahru area.

Heavy rainfall during the last week of the month in Ulu Kelantan brought the Kelantan River up to flood level throughout its course.

Remarks on Crops.

Padi.—In North Kedah, fairly large areas are affected by a fungus disease which causes withering of the leaves and subsequent stunting of the plants. Preliminary examination indicates *Sclerotium oryzae* as the probable cause of the trouble. Some 1,500 acres are estimated to be affected in Kota Star District.

In Province Wellesley, Krian and the North and Central Circles of Perak, the crop made good growth generally and prospects are promising except for the late planted areas of south-east Krian and parts of Penang and the south of Province Wellesley. At Bruas in Perak, the crop has again suffered from attacks of "penyakit merah", an affection which investigation so far indicates is due to physiological causes. In the Sungei Manik area the crop promises well on the older areas of Stage I, but prospects are not quite so good on the newer areas of Stage I or in Stage II. At the Panchang Bedena and Tanjong Karang areas in Selangor good headway was made with planting, water now being sufficient over most of the land under cultivation.

In Negri Sembilan, prospects are generally good, exception being the Kuala Pilah District where a fairly large aggregate area remains unplanted.

Further flood damage occurred in Malacca, although crop prospects are reported to be generally good.

In Pahang, some damage by floods is reported from Temerloh District.

Rubber.—There was a further rise in the price of rubber. In Province Wellesley the continued upward tendency has led to mild speculation by some local dealers who have bought fully up to Penang price in anticipation of a further rise.

Reports on the matter of smoke cabinets indicate how desirable it is to study local conditions before deciding upon the advice to be given to small-holders on this subject. It is reported from Province Wellesley that one small-holder in the south is obtaining a substantial profit from smoking his rubber before sale, although in other parts of the Province it has been definitely shown that it pays the small-holder to sell unsmoked sheet rather than to use a smoke cabinet. On the other hand, Johore Central report records that all of the Malay owners of smoke cabinets have ceased to use them, as the price margin between smoked and unsmoked is so small that the small-holder incurs a loss by smoking his own rubber before sale. The Perak South report records that smoke cabinets have proved useful in Batang Padang District, in that they act as the first stage in a general improvement in methods of rubber production; a small-holder with a cabinet begins to take an interest in his sheet and improves it in other respects.

Coconuts.—Copra showed a strong and sustained upward movement during the month, the Penang price for sundried rising from $6.35 a picul to $8.50. The seasonal decline in crop is again mentioned in some reports. In Bagan Datoh, prices for nuts for copra making increased to $24 per 1,000, whilst the Negri Sembilan report records prices of $5 per 100 being paid for nuts for domestic consumption. The marked increase for the latter is partly attributable to "bulan puasa", when the extra demand for nuts for domestic purposes usually leads to increased prices.

Agricultural Stations and Test Plots.

Agricultural Stations.—A revised lay-out for poultry prepared by the Principal of the School of Agriculture was authorised to be put in hand on the Singapore Station and a comprehensive manurial and planting distance experiment was prepared for the Pineapple Station at Kota Tinggi, Johore.

Padi Stations and Test Plots.—At Telok Chengai Station in Kedah, several plots have been affected with the disease mentioned earlier and thought to be due to *Sclerotium oryzae.* Growth was satisfactory at the Krian Station and Plots except at Briah and Selinsing, where plants have not recovered from the bad start occasioned by the prolonged dry weather in August, which caused seedlings to be kept too long in the nursery at Briah and resulted in the planting of weakly seedlings at Selinsing. At Bruas Test Plot in Perak, "penyakit merah" is again much in evidence. At the Sungei Manik Station, the long season Seraups appear to be making much more satisfactory growth than the shorter season strains. Transplanting was completed on the Panchang Bedena and Tanjong Karang Plots in Selangor. At Pulau Gadong Station in Malacca floods have held up weeding operations and prevented any work being done on the mechanical cultivation area. The crop has made poor growth of late on some portions of the Station, and the Rice Research Chemist visited during the month in connexion therewith.

DEPARTMENTAL NOTES.

Appointment of Adviser on Agriculture.

Mr. O. T. Faulkner, C.M.G., B.A., late Director of Agriculture, Nigeria, arrived in Malaya on the 26th November, 1936, and assumed duty on the 27th as Director of Agriculture, Straits Settlements, and Adviser on Agriculture, Malay States.

Meeting of the Agricultural Advisory Committee.

A meeting of the Agricultural Advisory Committee was held at the Department of Agriculture, Kuala Lumpur, on the 12th November 1936, under the Chairmanship of the Hon'ble Mr. F. W. South, Acting Adviser on Agriculture. The varied aspects of Malayan agricultural industries were discussed, particular attention being directed to the proposals for the improvement of Malayan copra and canned pineapples by the adoption of a Malayan Mark Grading Scheme adapted to both industries.

The meeting was the last which Mr. South would attend prior to his departure from Malaya on retirement, and a vote of thanks for the valuable services which he had rendered on the Committee was recorded by a unanimous vote.

Farm School, Malacca.

The first year of the Farm School at Sungei Udang came to a close in November, and the presentation of certificates took place on the 17th November at 11 a.m. The Acting Director of Agriculture and the Chief Field Officer attended, and the certificates were given away by the Hon'ble the Resident Councillor, Malacca.

Leave.

Mr. A. E. Coleman-Doscas, State Agricultural Officer, Johore, has been granted 8 months and 11 days leave on full pay with effect from the 7th October 1936.

Mr. W. N. C. Belgrave, Chief Research Officer, has been granted 10 months and 4 days leave on full pay with effect from the 26th November 1936.

Mr. B. Bunting, Agriculturist, returned from leave on the 5th November, and resumed duty on the 6th November. Mr. Bunting has been appointed to act as Chief Research Officer during the absence on leave of Mr. Belgrave.

Statistical.
MARKET PRICES.

November 1936.

Major Crops.

Rubber.—The rapid rise in price recorded in October was continued during November, the Singapore price rising by more than 2 cents to exceed 31 cents per lb. Spot loose opened in Singapore at 29 3/16 cents per lb. and rose to 31 cents on the 18th and 19th November; thereafter it weakened slightly but improved again to reach 31 3/8 cents on the 27th, and closed at 31 5/16 cents.

The average price for the month of No. 1. X. Rubber Smoked Sheet was 30.37 cents per lb. as compared with 27.49 cents in October. The London average price was 8.56 pence per lb., and the New York price 17.84 cents gold as compared with 7.88 pence and 16.44 cents gold in the previous month.

Prices paid for small-holders' rubber at three centres during the month are shewn in the following table.

Table I.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, November, 1936.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.			Batu Pahat, Johore.			
	5	12	19	26	4	11	18	4	11	18	25
Smoked sheet	37.70	38.00	39.30			38.00	39.00				
Unsmoked sheet	36.00	37.00	38.00	37.77	34.50			35.20	36.50	37.80	37.10
Scrap			31.00								

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.
Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.
Transport from Kuala Kangsar to Prai by railway $6.20 per ton.
Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).
At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.
At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.
No purchases at Kuala Kangsar on the 25th November.

Palm Oil.—The improved position of the market for the Malayan commodities is shewn in Table II.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1936.	Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
November 6	£ 23. 0. 0	£ 12 10. 0
„ 13	23. 0. 0	12. 15. 0
„ 20	23. 0. 0	13. 10. 0
„ 27	24. 0. 0	13. 15. 0

Copra.—There was a remarkable advance in the price of copra during the month, the total rise exceeding $2 per picul although there was not a large volume of business passing. The sun-dried grade opened in Singapore at $6.20 per picul and rose steadily and rapidly to reach $8.50 on the 28th November, weakening slightly to close at $8.25 per picul. The average price for the month was $7.13 per picul, and for the mixed grade $6.79 per picul, as compared with $5.83 and $5.49 respectively in October.

Copra cake continued unchanged at $2 per picul.

Rice.—The average wholesale prices of rice per picul in Singapore in October were as follows:—Siam No. 2 (ordinary) $3.71, Rangoon No. 1 $3.30, Saigon No. 1 $3.40, as compared with $3.75, $3.47 and $3.77 respectively in September. The corresponding prices in October, 1935, were $4.37, $3.87 and $3.82.

The average retail market prices in cents per gantang of No. 2 Siam rice in October were: Singapore 24, Penang 29, Malacca 26, as compared with 25, 28 and 26 respectively in September.

The average declared trade value of imports of rice in October was $3.55 per picul, as compared with $3.60 in September and $3.52 in August.

Padi.—The Government Rice Mill, Krian, maintained its price unchanged at $1.90 per picul. Retail prices of padi ranged from 6 to 15 cents per gantang.

Pineapples.—Prices of canned pineapples were further reduced during the month, and closing prices per case were: Cubes $3.05, Sliced Flat $2.85, Sliced Tall $3.15, as compared with October closing prices of $3.25, $3.05 and $3.35 respectively.

Prices of fresh fruit per 100 were as follows:—Singapore $1.60 to $1.70; Johore, 1st quality $1.50 to $4, 2nd quality $1.20 to $3.50, 3rd quality 60 cents to $2; Selangor 90 cents to $1.50.

Beverages.

Tea.—Two consignments of upland, and eight of lowland, Malayan tea were sold on the London market during November, the former averaging 1s. 0¾d. and 1s. 1¼d. per lb., and the latter 11¾d. to 1s. 0½d. per lb.

Average London prices per lb. during November for consignments of tea from other countries were as follows:—Ceylon 1s. 2.82d., Java 11.79d., Indian Northern 1s. 0.8d., Indian Southern 1s. 0.36d., Sumatra 10.06d.

The latest Colombo average prices available are quoted from the *Weekly Tea Market Report,* 24th November, 1936, of the Colombo Brokers' Association, and are as follows, in rupee cents per lb.:—High Grown Teas 70 cents, Medium Grown Teas 65 cents, Low Grown Teas 64 cents.

Coffee.—Prices of coffee improved considerably during November. Sourabaya averaged from $13.56 to $14.81 per picul, and Palembang averaged $10.12 to $12.19 per picul. October average prices were $12.30 to $13.30, and $7.75 to $9.25 respectively.

Spices.

Arecanuts.—The following are the averages of the ranges of Singapore prices per picul during November: Splits $7 to $9; Red Whole $5.15 to $6; Sliced $4.75 to $6.31.

The Singapore Chamber of Commerce prices rose considerably, average prices per picul being: Best $7.91, Medium $7.25, Mixed $6.50.

Pepper.—Prices continued nominal in Singapore but were marked up by sellers during the month. Closing prices per picul were: Singapore Black $8.50, Singapore White $16.50, Muntok White $17.

Nutmegs.—Both 110's and 80's were again quoted at the same prices during November and averaged $29.50 per picul as compared with $28.80 in the previous month.

Mace.—Siouw remained unchanged at $100 per picul throughout the month, as compared with the October average of $94. Amboina weakened, averaging $73 per picul as compared with $78.40 in October.

Cardamoms.—Green cardamoms were quoted during November in the Ceylon Chamber of Commerce reports at Rs. 2.00 to Rs. 2.21 per lb.

Miscellaneous.

Derris (*Tuba Root*).—The Singapore market was dull throughout the month and prices weakened by $2 per picul. Roots sold on a basis of rotenone content were quoted at $46 per picul, and roots sold on a basis of ether extract at $28 per picul, as compared with $48 and $30 respectively in October.

Gambier.—Singapore prices remained unchanged during November at $5.25 and $10.50 per picul for Block and No. 1 Cube respectively.

Tapioca.—Singapore prices continued unchanged throughout the month. Prices per picul were: Flake Fair $5.50, Seed Pearl $5.75, Medium Pearl $6.50.

Sago.—Pearl, Small Fair, was quoted throughout November at $4.60 per picul, and Flour, Sarawak Fair, averaged $3.19 per picul. October average prices were $4.63 and $3.13 per picul respectively.

Tobacco.—The general range of prices of locally-grown tobacco was as follows (per picul):—1st quality $18 to $45, 2nd quality $15 to $32, 3rd quality $10 to $20. Prices ranged from $70 to $80 in certain districts of Johore, and in Selangor $100 and $75 per picul were reported for 1st and 2nd quality respectively. The range of prices in Kedah was $80, $70 to 90, and $55 to $70 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Kohyei & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57 Trafalgar Square, London, W.C. 2.

GENERAL RICE SUMMARY*

October 1936.

Malaya.—Imports of foreign rice during October were 64,177 tons,† and exports 15,265 tons, net imports being 48,912 tons. Net imports for the ten months January to October aggregated 440,545 tons as compared with 407,949 tons in 1935.¶

Of the October imports 51 per cent. were consigned to Singapore, 12 per cent. to Penang, 7 per cent. to Malacca, 23 per cent. to the Federated Malay States, and 7 per cent. to the Unfederated Malay States. The imports by countries of origin were as follows (in tons, percentages in brackets):—Siam 43,729 (68.1); Burma 17,104 (26.7); French Indo-China 2,690 (4.2); other countries 654 (1.0).

Of the October imports 71 per cent. were consigned to the Netherlands Indies, and 29 per cent. to other countries. The various kinds of rice exported were as follows (in tons, percentages in brackets):—Siam 12,598 (82.5); Burma 1,945 (12.7); French Indo-China 541 (3.6); parboiled 131 (0.9); local production 50 (0.3).

India and Burma.—Foreign exports for the period January to September 1936 totalled 1,049,000 tons, as compared with 1,416,000 tons in 1935, a decrease of 25.9 per cent. Of these exports 3.5 per cent. were to the United Kingdom, 17.0 per cent. to the Continent, 29 per cent. to Ceylon, 21.7 per cent. to the Straits Settlements and the Far East, and 28.8 per cent. to other countries. The corresponding 1935 percentages were 4.2, 10.5, 23.7, 31.9, and 29.7

According to the first rice forecast for All-India for the season 1936-37 (*Indian Trade Journal*, 5th November 1936), the total area sown is reported to be 77,786,000 acres as against 75,698,000 acres, the corresponding estimate (revised) of last year.

Reports indicate (*Bangkok Times*, 26th October 1936) that the sown area in Burma is approximately up to normal.

Siam.—Exports of rice and rice products from Bangkok during August were 134,826 tons; the total for the eight months was 1,078,851 tons as compared with 1,009,641 tons in 1935.

According to reports received from sixty provinces of Siam, approximately 6,944,915 acres had been planted with rice by the end of October, a decrease of about 640,000 acres as compared with 1935.

There is a heavy increase in the damaged rice land, largely caused by lack of rainfall, other causes being flood, crabs and insects. The damaged area amounts to 865,978 acres as compared with 672,201 acres at the same time last year.

Japan.—The rice crop for Japan for 1936 was estimated at 9,514,727 tons, or 17.1 per cent. above the actual crop of last year, and 14.1 per cent. above the average of the last five years. The Korean rice crop for 1936 was estimated at 2,798,036 tons, or 11.3 per cent. above the actual crop of last year.

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* Abridged from the Rice Summary for October 1936, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† Tons = long tons (2,240 lbs.).

¶ It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1935.

The area under rice for the second Formosan rice crop of 1936 was estimated at 938,791 acres, a decrease of 0.52 per cent. as compared with the corresponding figure of last year. The estimated crop is 714,426 tons.

French Indo-China.—Entries of padi into Cholon during the first ten months of 1936 totalled 1,380,620 tons as compared with 1,497,366 tons in 1935, a decrease of 7.8 per cent. Exports of rice during the same period were 1,496,509 tons, as compared with 1,555,321 tons in 1935, a decrease of 3.8 per cent.

The Netherlands Indies.—The latest information available was published in the July Summary.

Ceylon.—Imports during January to October 1936 aggregated 435,247 tons, as compared with 444,392 tons in 1935, a decrease of 2.1 per cent. Of these imports 13.9 per cent. were from British India, 62.8 per cent. from Burma, 0.5 per cent. from the Straits Settlements, and 22.8 per cent. from other countries. The corresponding 1935 percentages were 12.9, 68.2, 0.8, and 18.1.

Europe and America.—Shipments from the East to Europe during the period 1st January to 8th October totalled 1,016,085 tons, as compared with 604,023 tons in 1935, an increase of 68.2 per cent. Of the 1936 shipments 28.1 per cent. were from Burma, nil from Japan, 62.9 per cent. from Saigon, 8.1 per cent. from Siam, and 0.9 per cent. from Bengal. The corresponding percentages for 1935 were 52.6, 3.9, 37.0, 4.7 and 1.8.

Shipments for the Levant from 1st January to 6th October totalled 11,060 tons as compared with 26,739 tons in 1935, a decrease of 58.6 per cent. Shipments for Cuba, West Indies and America from 1st January to 8th October totalled 208,472 tons, an increase of 8.4 per cent. when compared with 192,404 tons in 1935.

MALAYAN AGRICULTURAL EXPORTS, OCTOBER, 1936.

PRODUCT.	Net Exports in Tons				
	Year 1935	Jan.-Oct. 1935	Jan.-Oct. 1936	October 1935	October 1936
Arecanuts ...	21,885	18,702	23,781	2,670	2,543
Coconuts, fresh † ...	106,272†	90,623†	98,769†	11,665†	5,744†
Coconut oil ...	35,911	28,270	39,291	3,701	4,472
Copra ...	111,752	84,043	62,744	6,079	6,631
Gambier, all kinds ...	2,837	2,440	1,759	372	165
Oil cakes ...	11,361	8,902	13,135	1,524	1,139
Palm kernels ...	3,892	3,118	4,133	526	713
Palm oil ...	24,996	19,035	23,772	2,239	2,682
Pineapples canned ...	73,923	59,159	67,803	3,790	3,912
Rubber ¶ ...	378,381¶	326,731¶	301,958¶	34,588¶	36,799¶
Sago,—flour ...	10,920	7,945	6,239	1,435	363*
,, —pearl ...	4,655	3,939	2,794	460	353
,, —raw ...	7,735*	6,089*	6,059*	940*	565*
Tapioca,—flake ...	1,953	1,625	1,303	193	87
,, —flour ...	755*	524*	1,603*	7	201*
,, —pearl ...	17,169	15,042	14,702	2,023	1,836
Tuba root ...	567	469	516	39	26

† hundreds in number. * net imports. ¶ production.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS (IN LONG TONS)

(As declared by Estates)

Month 1936	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S
January ...	1,395.4	326.5	258.6	37.2
February ...	1,531.9	372.4	244.2	54.6
March ...	1,878.4	534.5	302.9	88.0
April ...	1,410.6	446.8	250.0	80.0
May ...	1,346.1	644.8	238.1	114.6
June ...	1,557.4	658.3	245.5	100.9
July ...	2,270.5	975.7	349.1	147.6
August ...	2,963.2	1,029.0	419.2	163.0
September ...	2,671.5	969.9	394.2	136.9
October ..	2,312.3	928.6	434.6	133.0
Total ...	19,337.3	6,886.5	3,136.4	1,055.8
Total January to October 1935 ...	14,722.8	5,035.4	2,157.6	176.8
Total for year 1935 ...	17,338.7	5,764.6	2,711.1	818.4

MALAYAN RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31ST OCTOBER, 1936.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1935	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (*a*)		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,526	400	0.9	16,119	36.2	521	1.2	16,519	37.1
Malacca	121,601	4,325	3.6	29,678	24.4	2,848	2.3	34,003	28.0
Penang Island	2,575	675	26.2	503	19.5	264	10.3	1,178	45.7
Singapore Island	34,525	3,561	10.3	9,901	28.7	334	1.0	13,462	39.0
Total S.S. ...	203,227	8,961	4.4	56,201	27.7	3,967	2.0	65,162	32.1
FEDERATED MALAY STATES :—									
Perak	294,988	9,374	3.2	69,796	23.6	14,537	4.9	79,170	26.8
Selangor	332,165	10,721	3.2	64,113	19.3	14,803	4.5	74,834	22.5
Negri Sembilan	258,304	10,951	4.2	53,830	20.9	16,252	6.3	64,781	25.1
Pahang	77,210	10,919	14.1	24,631	31.9	16,974	22.0	35,550	46.0
Total F.M.S. ...	962,667	41,965	4.3	212,370	22.1	62,566	6.5	254,335	26.4
UNFEDERATED MALAY STATES :—									
Johore	432,443	32,567	7.5	63,597	14.7	38,830	9.0	96,164	22.2
Kedah	199,607	14,699	7.4	25,400	12.7	15,329	7.7	40,099	20.1
Kelantan	30,474	403	1.3	9,002	29.5	3,768	12.4	9,405	30.9
Trengganu (*b*)	4,643	Nil	Nil	Nil	Nil	138	3.0	Nil	Nil
Perlis (*c*)	1,575	Nil	Nil	761	48.3	59	3.7	761	48.3
Brunei	6,010	Nil	Nil	1,662	27.7	963	16.0	1,662	27.7
Total U.M.S. ...	674,752	47,669	7.0	100,422	14.9	59,087	8.8	148,091	21.9
TOTAL MALAYA ...	1,840,646	98,595	5.4	368,993	20.0	125,620	6.8	467,588	25.4

Notes :—(*a*) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
(*b*) Registered Companies only.
(*c*) Rendered quarterly.

MALAYAN RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF OCTOBER, 1936, IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports during the month		Imports January to Oct. 1936		Exports including re-exports during the month		Exports including re-exports January to Oct. 1936		Stocks at end of month			Consumption 3	
	Ports	Dealers	Estates of 100 acres and over	during the month	January to Oct. 1936	during the month	January to Oct. 1936	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	January to Oct. 1936
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	5,418	12,575	10,867	101,885	8,734	54,075	Nil	Nil	Nil	Nil	13,231	5,339	115,321	40,054	...	7,511	11,501	12	97
Johore ...	...	1,876	4,517	3,979	40,982	4,682	32,198	Nil	24	Nil	769	3,108	5,101	22,978	49,956	...	2,726	4,143	...	...
Kedah ...	...	196	2,870	2,843	25,694	1,247	7,587	Nil	Nil	Nil	Nil	1,520	2,244	14,262	19,192	...	480	2,912	...	...
Perlis ...	...	11	17	14	112	33	198	Nil	Nil	Nil	Nil	Nil	34	Nil	293	...	24	17	...	...
Kelantan ...	...	203	387	316	2,913	979	5,835	Nil	Nil	Nil	Nil	239	1,059	1,494	7,218	...	305	282	...	...
Trengganu ...	...	55	50	226	2,254	113	1,127	Nil	Nil	Nil	Nil	Nil	339	Nil	3,381	...	55	50	...	...
Brunei ...	...	2	54	55	441	102	635	...	...	...	...	...	152	...	1,068	...	24	37	...	...
Total Malay States	...	7,761	20,470	18,300	174,281	15,890	101,655	Nil	24	Nil	769	18,098	14,268	145,055	121,162	...	11,125	18,942	12	97
S. SETTLEMENTS :—																				
Malacca ...	...	2,348	1,224	1,087	10,171	659	5,808	Nil		Nil		3,162		24,331		...	1,991	1,087	...	...
Province Wellesley	...	829	568	439	4,085	196	2,150	Nil		Nil		7,837		73,426		...	1,060	544	...	...
Penang ...	2,203	3,511	5	13	153	31	831	2,882	13,424	26,049	114,771		Nil		Nil	2,024	3,504	7	...	...
Singapore ...	5,999	15,223	129	123	1,405	47	1,259	10,031		114,431		17,302		182,274		4,814	14,251	171	34	261
Labuan ...	...	17	Nil	Nil	Nil	14	161	50		641		Nil		Nil		...	14	Nil	...	...
Total Straits Settlements ...	8,202	21,928	1,926	1,662	15,814	947	10,208	12,963	13,424	141,121	114,771	28,301	Nil	280,031	Nil	6,838	20,820	1,809	34	261
Total Malaya ...	8,202	29,689	22,396	19,962	190,095	16,837	111,863	12,963	13,448	141,121	115,540	46,399	14,268	434,086	121,162	6,838	31,945	20,751	46	358

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	6,394	13,836	3,274	2,627	2,245	229
WET RUBBER	1,117	415	230	462	481	251
TOTAL ...	7,511	14,251	3,504	3,089	2,726	480

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to Oct. 1936
29	30	31
Singapore ...	28,985	274,050
Penang ...	11,617	106,720
Port Swettenham	5,576	49,878
Malacca ...	221	3,438
MALAYA ...	46,399	434,086

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	January to Oct 1936
32	33	34
Malay States ...	32,366	275,217
Straits Settlements	2,893	25,323
MALAYA ...	35,259	300,540

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Column (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication, therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 25th November, 1936.

METEOROLOGICAL SUMMARY, MALAYA, OCTOBER, 1936.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B.	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						Hrs.	Hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	90.1	72.1	81.1	95	70	79	74	83.9	84.9	9.49	241.1	2.06	23	21	5	4		151.75	4.89	40
Bukit Jeram, Selangor ...	88.5	72.1	80.3	93	70	82	74	84.7	86.1	7.16	181.9	2.07	23	16		1	1	179.00	5.77	48
Sitiawan, Perak ...	87.8	73.2	80.5	93	70	82	76	83.7	84.6	6.74	171.2	1.20	24	19				162.90	5.25	44
Temerloh, Pahang ...	87.6	72.2	79.9	91	70	75	74	85.1	86.2	10.87	276.1	2.79	22	17	1	3		158.55	5.11	42
Kuala Lipis, Pahang ...	87.7	71.2	79.5	92	68	77	74	83.4	84.7	13.91	353.3	2.12	22	20	2	14	1	139.85	4.51	38
Kuala Pahang, Pahang ...	85.3	73.7	79.5	91	71	74	75	83.3	86.2	24.11	612.4	4.90	21	19	2			142.90	4.61	38
Kallang Aerodrome, S'pore ...	84.6	74.7	79.7	89	71	77	80	81.8	83.7	11.57	293.9	2.46	23	19			1	138.80	4.48	37
Butterworth, Province Wellesley ...	86.9	73.9	80.4	91	72	82	77	84.5	85.4	14.25	362.0	2.42	18	16	2			162.60	5.25	44
Bayan Lepas Aerodrome Penang ...	86.3	74.4	80.3	90	69	81	77	83.3	83.9	13.97	354.9	2.40	21	16	2		1	150.10	4.84	40
Bukit China, Malacca ...	84.8	73.1	78.9	88	70	76	77	83.0	84.4	13.61	345.7	3.35	24	19	2		1	167.65	5.41	45
Kluang, Johore ...	87.0	71.4	79.2	91	68	76	74	81.2	82.2	14.64	371.9	2.17	26	24	6	3		126.75	4.09	34
Bukit Lalang, Mersing, Johore	84.1	71.7	77.9	90	69	77	73	81.0	81.8	24.20	614.7	3.62	24	23	3			129.75	4.19	35
Alor Star, Kedah ...	87.0	73.7	80.3	91	72	80	78	83.3	84.3	14.97	380.3	5.29	20	17				153.30	4.95	41
Kota Bahru, Kelantan ...	85.8	73.1	79.5	92	71	75	75	83.8	85.3	26.68	677.7	13.04	26	22	3		2	137.20	4.43	37
Kuala Trengganu, Trengganu	84.7	72.6	78.7	90	71	77	74	81.7	83.5	30.12	765.1	7.95	25	22	2	1	2	135.90	4.38	37
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	72.7	62.1	67.4	78	59	63	65	71.4	72.3	12.24	310.9	1.98	26	21		18		117.55	3.79	32
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	71.1	58.1	64.6	77	51	65	62	70.2	70.2	8.72	221.5	1.64	27	26	2	1		115.70	3.73	31
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	70.6	59.3	64.9	77	57	62	61			9.13	231.9	2.29	27	22			1	119.40	3.85	32

Compiled from Returns supplied by the Meteorological Branch, Malaya.

THE
AGRICULTURAL BULLETIN
OF THE
FEDERATED MALAY STATES
AND THE
MALAYAN AGRICULTURAL JOURNAL

CLASSIFIED LIST
OF THE
PRINCIPAL ORIGINAL ARTICLES
1912 to 1935
(VOLS. I to XXIII)

DEPARTMENT OF AGRICULTURE
S. S. & F. M. S.
KUALA LUMPUR.

PREFACE.

A Classified List of principal articles which had appeared in the first eighteen volumes of the monthly journal of the Department of Agriculture was compiled, in the first place, for departmental use. In order that the List might be made available to a wider range of students of Malayan agriculture, it was published in 1931.

The present Classified List is revised to include the twenty-three volumes and thus brings the subject matter up to the end of 1935. In addition, the information contained in the first edition of the List has been carefully revised.

It should be explained that the monthly publications of the Department ot Agriculture commenced with *The Agricultural Bulletin of the Federated Malay States* in August, 1912. With the tenth volume (1922) the title was changed to *The Malayan Agricultural Journal*, but no material alterations were made in the format. With the eighteenth volume (1930) the size and format of the Journal were considerably altered, but its title was retained.

By some of the titles of articles recorded in this list the older residents of Malaya will be reminded of burning agricultural problems of past days; other articles bring to mind innovations upon which estate practice was rapidly improved.

Some of these articles are now of little more than academic interest, but many of them represent pioneer work which has since been translated into the ordinary practice of planting in Malaya. The record of work performed during the past twenty-four years, as exemplified in the following pages, is evidence of the wide field covered by the activities of the Department.

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The publications referred to in the following classified list may be obtained from the Department of Agriculture, Kuala Lumpur, F.M.S., or through any bookseller in Malaya. They can also be obtained through the Malayan Information Agency, 57, Trafalgar Square, London, W.C. 2.

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SPECIAL BULLETINS.

(Numbers no longer available are printed in italics).

Old Series.

No. 1. Notes on *Termes gestroi* and other species of Termites found on Rubber Estates in the Federated Malay States: by H. C. Pratt, 1910. Reprint 1916, 20 cents.

2. *Root Diseases of Hevea Brasiliensis, the Para Rubber Tree: by W. J. Gallagher, 1916, 20 cents.*

3. *Observations on Termes gestroi as affecting the Para Rubber Tree, and methods to be employed against its ravages: by H. C. Pratt, 1910. Reprint 1916, 20 cents.*

4. *A Lepidopterous pest of Coconuts, Brachartona catoxantha Hamps. (Zygaenidae): by H. C. Pratt, 1909, 20 cents.*

5. *The extermination of Rats in Rice-fields: by W. J. Gallagher, 1909, Reprint 1916, 20 cents.*

6. *A preliminary note on a Branch and Stem Disease of Hevea Brasiliensis: by W. J. Gallagher, 1909. Reprint 20 cents.*

7. *Coffee Robusta: by W. J. Gallagher, 1910, 20 cents.*
8. *The Cultivation and care of the Para Rubber Tree (in Malay), 1910, 20 cents.*
9. *Die-back Fungus of Para Rubber and Cacao: by Keith Bancroft, 1911, 20 cents.*
10. *A Lecture on the Para Rubber Tree: by W. J. Gallagher, 1910, Reprint 1916, 20 cents.*
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The Tamil Agricultural Journal.

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NOTE.

Articles have been classified primarily under the specific crops to which they refer, and this system has also been adopted in the case of articles dealing with pests and diseases.

There are, however, in addition the following sections in which articles of a more general nature have been indexed:—

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Agriculture—Economics

Chemical Notes

Co-operation

Cover Crops

Economic Products

Education

Entomological—Miscellaneous

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